Telephony.

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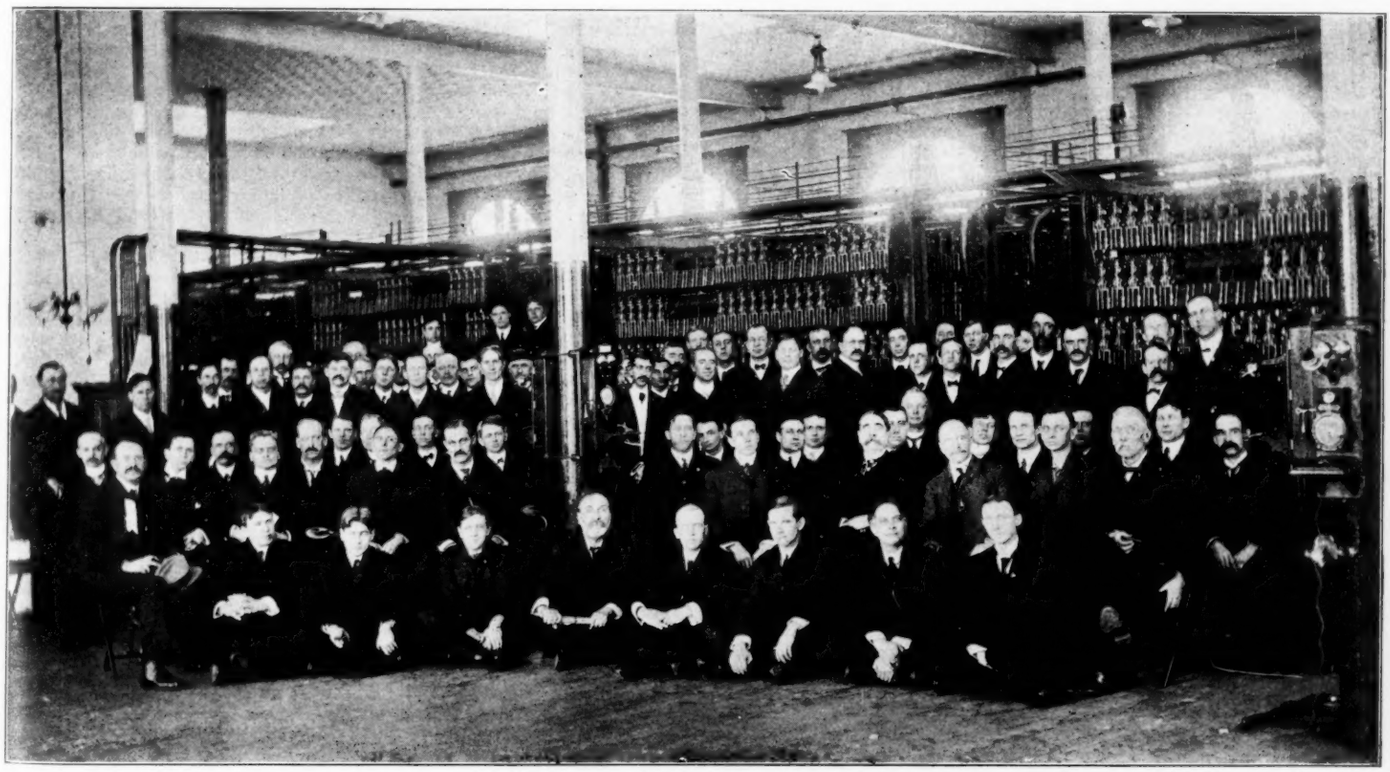
The Michigan Telephone Convention

The annual convention of the Michigan Telephone Association was held at Grand Rapids, Mich., on February 24 and 25, 1904. The attendance was large and a deep interest in the convention proceedings was manifested by the delegates in attendance. The Citizens' Telephone Company entertained the visiting telephone men.



ATTENDANTS MICHIGAN INDEPENDENT TELEPHONE CONVENTION, GRAND RAPIDS, FEBRUARY 24-25, 1904.

The convention was opened by the mayor's secretary, who made the address of welcome, which was responded to by E. B. Fisher, president of the association. The association's treasurer, R. F. Johnson, then made his report, which showed the association to be in good shape, there being a comfortable cash balance in the treasury. Following the treasurer's report Dr. G. S. Root of Hart read a paper on "Our Experience with Farm Telephones," which will be found in the convention papers in this issue.

R. F. Johnson, instead of reading the paper assigned him, read one which was prepared for a previous meeting.

J. W. Melcher followed with a paper on "Telephone Accountants." The first day's session was brought to a close by a banquet tendered by the Citizens' Telephone Company. When the second day's session was called to order R. B. McPherson read a paper on "Our Needs in Southern Michigan," which was followed by "Rural Development in Jackson County," read by N. F. Wing of Jackson. Following Mr. Wing C. E. Tarte read a paper entitled "Is the Time Right for Three-Minute Service?" which was published in full in last month's TELEPHONY. Following Mr. Tarte, the paper by H. A. Douglas was read on "A City's Relation with Rural Lines," which appears in this issue under convention papers. J. B. Ware then read a paper on "The Na-

tional Situation of Independent Telephone Companies," which follows:

MR. WARE'S PAPER.

This State association was one of the first to be formed and was organized in 1897, seven years ago.

While several states claim to be the birthplace of the Independent movement, Michigan seems to have as good ground for such claim as any. Whatever difference there may be as to the birthplace, I feel confident that few, if any, acquainted with the history of the movement, will question our right to claim Michigan as the home of this enterprise in its childhood days, and that its present proportions are largely the outgrowth of the early start and the strength which it obtained on Michigan soil. Not alone was one of the first opposition exchanges built in our state, but Michigan was the first to have an Independent exchange in operation, numbering 500 telephones; also the first to have 1,000, also 2,000 and 5,000; also the first to have an automatic exchange with 5,000 telephones in service; also the first in which an opposition company put up copper metallic toll circuits. I regret to recall to your attention that our state was also the first having in it men who planned to succeed as Independents, and then betray the movement, by sale, to the Bell interest, and that these men so nearly succeeded in their treacherous attempt, as to cause in the minds of many, even to this day, suspicion to rest on telephone men in general, as to their honesty and uprightness.

Thus we have in our state's telephone history, and within the short space of seven years, the two extremes of honorable and dishonorable record; but, as must always be true, honesty does pay, and success has crowned the honest effort.

In addition to the record already mentioned, we have, in common with many other states, the satisfaction of having seen the Independent movement a constantly increasing success year by year, until to-day there are in the United States, more Independent telephones in use, than there are Bell telephones by exchange subscribers; and that as a rule, those using Independent are receiving much better exchange service than are those using Bell instruments; and, further, the Independent companies have proven financially successful, with exceedingly few exceptions. Until about 1895, the Bell interests had no competition in the telephone field, and there were no successful opposition companies previous to eight years ago.

It is not my purpose to review the history of the Independent movement, but to mention briefly a few facts and figures which indicate, though inadequately, the present condition of the movement in different sections of our country.

The Independent telephone development has been most rapid and successful in the Middle and Central Western states, where it started, and is most retarded in the extreme Eastern states.

Thus in the six New England states, a very populous section of our country there are fewer Independent telephones in service than in each of more than 20 other states in the Union.

The reason for this condition is generally and rightfully understood as being, principally, because of the political influence of the Bell company in the territory named, which, united with that of the Boston & Hartford Railroad interests, apparently have absolute control of legislation in the majority of these states. The difficulties in securing franchises for opposition telephone plants, are almost insurmountable, and are greater than in any other section of our country.

Another factor, however, not generally understood, has bearing on the situation named, being the restrictions placed on the use of the automatic apparatus, under Strowger patent, by reason of the heavy royalty charged in certain of these states.

The automatic apparatus named first secured a foothold in these Eastern states, over the most of which the Eastern Automatic Telephone Company secured exclusive rights to use apparatus manufactured under said patents. This company, having its headquarters in Boston, the home of the Bell Company, followed the ruinous Bell policy of charging such a heavy royalty on each telephone used as to almost prevent the use of automatic apparatus in the states named. While this same condition formerly existed in other sections of the country, fortunately for the Independents, the Strowger patents are now owned and controlled by the Automatic Electric Company of Chicago. This company, like all other Independent telephone manufacturing corporations, sells outright its apparatus and telephones, upon which there is no royalty. It has secured the state rights of all such companies, other than the Eastern automatic, and is endeavoring to obtain such rights from that company, in order that there may be no royalty burden in the Independent field. It is to be hoped that it may succeed in removing this unfortunate and unreasonable burden from this unfortunate section of our country.

However, in the New England states, valuable development has already taken place; thus in Massachusetts are the Fall River and New Bedford exchanges; in Maine, the Portland exchange. These, with others in smaller cities, give evidence of a splendid telephone development which we may expect in the very near future will be realized in this home territory of the Bell companies.

In the state of New York, outside of New York city, the Independents have occupied every city and town of importance and operate more telephones than do the several Bell companies occupying that territory. The estimate of the number of Independent telephones in the western half of the state is 45,000, and for the eastern half 30,000, a total of 75,000.

In a majority of cases, the larger exchanges in New York have been built in the last two years, and the greater number of those having 500 or more telephones in operation are the central energy type of exchanges.

The toll line and long distance construction is modern; especially is this true in Western New York, where the poles used are principally thirty feet cedar, with eight-inch tops, and the copper circuits not smaller than No. 10. No better construction has been made by either Bell or Independent interests in any state.

Of the cities having Independent exchanges in operation, are Buffalo, with 7,000 telephones, and Rochester, having over 6,000 telephones; Troy, with 4,000; Albany, Utica, Syracuse, Binghamton and Jamestown, averaging 2,500 each; Herkimer, Glens Falls, Saratoga Springs, Schenectady, Rome, Cortland, Ithaca, Elmira, Hornellsville, Geneva, Auburn, Johnstown and Niagara Falls, averaging over 1,000 each. The Independents have more telephones in service in these twenty-one cities named than have the Bell companies. In four of the cities, the Bell has the larger number of telephones; in twelve, the Independents have the larger number, and in the remaining five the numerical strength is equal. In the smaller cities, villages and rural communities throughout the state, without any noticeable exception the Independents have much better development than have the Bell licenses. The conditions to-day, and the outlook, is most favorable to the Independent.

In New Jersey and Pennsylvania all important cities and towns have been occupied by Independent companies; thus, in Philadelphia, there are nearly 12,000 Independent telephones in service; in Pittsburg and Allegheny, over 11,000; in Paterson and Trenton, N. J., and in Scranton, Wilkes Barre, Erie, Harrisburg and other important Pennsylvania cities, the Independent telephones largely exceed those of the Bell. In the smaller cities and towns throughout these two states the Independents have been even more successful than in the larger.

The state of Maryland has been well developed, the Independents in Baltimore having over 8,000 telephones in service previous to the recent fire. The three states of New Jersey, Pennsylvania and Maryland have good long distance toll line development with Philadelphia as a center. (It is interesting to note at this point that Philadelphia has a toll board of twenty-one positions, being the largest in the Independent field, with one exception.)

In Virginia and in the Gulf states much progress has been made by the movement during the past two years. Exchanges have been established among the important cities, such as Norfolk, Va.; Columbia and Charleston, S. C.; Jacksonville and Tampa, Fla.; Atlanta, Augusta and Savannah, Ga.; Birmingham and Mobile, Ala.; San Antonio, Waco, Ft. Worth, Houston and Austin, Tex., besides many exchanges in the smaller cities and towns in the states named. While in Florida and others of the states the development has been rapid, yet in Texas the development has been most remarkable. In this state not a city or town of importance but has an Independent exchange in operation, or one rapidly approaching completion. The character of construction is excellent and the long distance toll lines now building and planned insure for Texas in an exceedingly short time adequate exchange and toll service.

In the states of Tennessee, Kentucky and West Virginia some very satisfactory development has been made. The cities of Vicksburg and Memphis, Tenn.; Lexington, Louisville and Knoxville, Ky.; Charleston and Wheeling, W. Va., are perhaps the most prominent of the Independent exchanges. These, with numerous other exchanges in the three states, have already secured long distance toll connections with the states to the northward, Ohio and Indiana particularly.

These last two mentioned states are foremost in telephone development. In Indiana, all cities, towns and villages, with hardly an exception, are successfully occupied by the Independents, and fine long distance lines have already been completed; so that, second only to Ohio, its telephone development is the most complete of any in the United States.

In Ohio, the entire state with the single exception of Cincinnati, has been occupied by the Independents with their exchanges and toll lines. So complete has been this development it is unnecessary to enumerate any of the cities occupied.

The relative strength of the two interests, numerically, in the states mentioned is as follows:

	Independents.	Bell.
Ohio	145,000	89,000
Indiana	107,000	40,000
Total	252,000	129,000

being nearly "two to one."

Besides numerous small exchanges in Minnesota, the cities of St. Paul, Minneapolis and Duluth have large successful exchanges in operation, with more telephones in service than have the Bell companies in said cities.

In a large portion of the state of Illinois, the same general results have been attained, as in a majority of the states already mentioned. In Chicago, the Illinois Telephone & Telegraph Company (the Automatic) has its tunnels completed, forty feet below the streets, and under the most important business sections of the city. There are over twenty-two miles of these tunnels at the present time. This company has already constructed one exchange on the corner of Fifth avenue and Monroe streets, which has 4,000 automatic telephones in service. It is expected this company will have over 20,000 telephones working in Chicago within the coming twelve months. The plan has been announced to construct long distance lines from Chicago to the connecting lines of the other Independent companies. Actual work on this development is to begin in the spring.

In Wisconsin, the Independents are rapidly growing, and have over 35,000 telephones, which number is greater than the Bell telephones in the state, outside of the city of Milwaukee.

Iowa is the home of many companies, there being over 1,200 Independent companies in that state, with many more telephones than has the Bell. The long distance lines are now receiving more than usual attention, and the people of Iowa will soon have adequate exchange and toll line facilities

Missouri is also ours. St. Louis, with its more than 12,000 telephones, exceed in number those of the Bell; Kansas City's new exchange has just opened, built for 12,000 subscribers, and it has every prospect of driving the Bell to the wall. St. Joseph, Jefferson City, Hannibal, Joplin, Springfield, Clinton, in fact, all the cities of the state have independent exchanges; and it is estimated that there are twice as many Independents as there are Bell telephones in Missouri. Excellent long distance lines are being constructed, and the future is assuredly favorable only to the Independents.

In Kansas the number of Independent telephones exceeds 50,000, while the number of the Bell is less than 9,000. In Oklahoma, a condition very similar to that in Kansas prevails. The long distance system connecting Missouri, Kansas and Oklahoma are about completed, and as a rule, are of better construction than are the lines in many of these sections.

In Nebraska, the Dakotas, and other Western states, the movement is well established and steadily growing.

In the coast states California, Oregon and Washington—a very remarkable development has taken place during the past two years. Thus, Southern California has been completely developed by the Independents. In Los Angeles they have 12,000 telephones in service and are growing at a tremendous rate. In Portland, Ore., and in Seattle, Wash., fine exchanges have been recently completed.

The indications are that California, the heretofore famous stronghold of the Bell interests, will within a very short time pass into the control of the Independents, and thus be forever freed from the Bell domination, with its high rates and low quality of service.

I have not as yet, nor will I, take up in detail the very gratifying situation in Michigan, as you are familiar with the same. We have about 50,000 telephones in the state, as against the 51,000 claimed by the Bell. If Detroit and that portion of the other cities "sold" four years ago, and which as yet have not been redeemed, are omitted, we have over 20,000 more telephones in service than has the Bell company.

As the result of the twenty-five years' history of the Bell movement it has less than 1,500,000 telephones now in use by its exchange subscribers in the United States. The result of the eight years of the Independent movement shows 2,000,000 telephones in service. Of the 180 cities having over 25,000 inhabitants, according to the last census, seventy per cent now have Independent exchanges in operation.

In conclusion, I wish briefly to refer to the very satisfactory financial success, as a whole, of this movement. Few indeed have been the number of failures among the more than 6,500 Independent companies. The Bell company has compiled and is widely advertising its record of these failures, which number less than a score—not one of which occurred in our own state.

The cities of Boston, New York, Washington, New Orleans, Cincinnati, Chicago, Milwaukee and San Francisco, are the only cities having more than 200,000 population, in which telephone competition is not established; and Chicago must soon be dropped from this list as heretofore shown. Each of the cities just named has a local Bell licensee company, which is at present very prosperous. Other licensee Bell companies have ceased paying dividends, and are understood to be in unsatisfactory financial condition. Even the parent company (the American Telephone and Telegraph Company), owning as it does the majority of the stock in each of its many licensee, or Bell companies, and dependent for its financial success upon the royalties which said companies pay on each telephone used, has apparently been seriously affected by the Independent competition, as indicated in part by the falling off in price of its stock from 167 in April, 1902, to 117 in October, 1903, its present price ranging about 122.

The various licensee or operating companies of the American Bell were capitalized years ago, and before competition existed, resulting in over-capitalization under present conditions. It seems certain that these companies cannot continue to pay interest on their securities, and also the royalties to the American Telephone & Telegraph Company. The policy of the American Telephone & Telegraph Company may possibly be foreshadowed as to its subordinate companies in the recent failure, foreclosure sale and reorganization of the Michigan Telephone Company, in which it held over seventy per cent of the capital stock. Its property was sold by the Union Trust Company of Detroit, as receiver, the sale realizing about eighty per cent of the mortgage foreclosed. The stockholders (some 743) lost $1,312,700. The American Telephone & Telegraph Company owned $3,687,300 of said stock, which was cut off by said foreclosure sale, as was also an indebtedness owing by the Michigan company to the American Telephone & Telegraph Company and its subordinate companies, amounting to over $2,500,000. It would thus appear that the American Telephone & Telegraph Company loses over $6,000,000 by this failure.

It is possible that some secret arrangement exists by which the parent company secures in the reorganization of the Michigan company some compensation not apparent to the public. It is possible that the parent company expects by the reorganization plan to secure the payment of its royalties which is absolutely essential to the American Telephone & Telegraph Company's existence. It is an interesting and grave question, however, whether there exists any rational solution to the desperate financial problem now confronting every Bell organization—whether there is yet one chance to save permanently valuable telephone property, which, through a wrong policy and mismanagement under same, has been brought to the very verge of a financial precipice which is as surely destructive as is the great Niagara to unfortunates once engulfed.

The failure of the Michigan Bell company, as stated, involves more property, and a loss to stockholders many times greater than the aggregate value of property and losses involved in all Independent telephone failures during the past seven years of their existence.

In the United States there are 4,700 national banks, and 1,078 savings banks (World's Almanac, 1904), making a total of 5,778 such banks. It is claimed, and I believe properly so, that the number of these bank failures during each of the past five years have exceeded the number of telephone companies (both Bell and Independent) that have failed during that entire period. No other class of business can make such a splendid showing, and no other business is of greater permanency or in greater demand in both the commercial and social world.

That the future appears to have an abundance of success and comfort to the Independents, none will deny, who are both posted and honest. That the same future appears to have very much of disaster and sorrow to the many Bell interests seems assured. Knowing their ability to furnish the very best quality of telephone service and at the lowest reasonable rates, and knowing that they have the confidence of the people, the Independent companies will go on to that assured success to which they are entitled by reason of their past efforts and their past accomplishments.

Upon the conclusion of Mr. Ware's paper the convention adjourned for lunch. When the afternoon session was called to order Charles F. Speed read a paper on "What We Are Doing in Wastenaw County," which appeared in the March TELEPHONY.

The reports of existing committees were then heard and new committees were appointed. The following resolution was introduced and adopted by the convention:

"Whereas, It is necessary to have the continued success of the Independent in order to permanently insure to all desiring telephone advantages, the benefit of good service at reasonable rates, and

"Whereas, The only menace to this very desirable condition is the possible destruction of successful Independent interests by so-called Independent competition, fostered by or working in the interests of Bell companies, and

"Whereas, The manufacturers and jobbers of Independent apparatus can prevent such competition to Independent interests by selling their apparatus only to companies or persons already doing successful Independent business, or to those who propose to build or operate Independent properties in territory not already occupied with Independent exchanges or lines; now therefore be it

"Resolved, That we condemn the practice of the manufacturers or jobbers in telephone apparatus in any way encouraging or assisting competition to Independent interests and request all such not to knowingly sell telephone apparatus to be used in competition with any successful Independent exchanges, farm or toll lines now in operation or which are actually in the course of construction. And we further request such manufacturers and jobbers not to employ agents or representatives who encourage or promote competition to Independent interests. We also call attention to the fact that the sale of inferior telephone apparatus to rural and other telephone companies is injurious to the best interests of Independent telephony, and the practice should be discontinued."

Resolutions condemning the recent order of Postmaster-General Payne were adopted as follows:

"Whereas, We understand that an order has been issued by the postoffice department restricting the use of telephones in postoffices to the one in connection with Washington, D. C., making it a necessity for them to use only the Bell company system, and

"Whereas, This, to the minds of Independent telephone men, appears to be an entirely unjust discrimination in favor of Bell company interests, by reason of the postmaster-general's connection and sentiment toward that monopoly, thereby using an official position of the government to further interests detrimental to the users of about 2,030,000 Independent telephones, as against about 1,230,000 users of Bell company telephones in the country; and

"Whereas, The Independent companies, being also long distance companies, but without connection with Washington, D. C., outnumbering the Bell companies, would be seriously injured in not having connection with the postoffices upon which they are dependent; and

"Whereas, It is unnecessary to retain the Bell connection solely for the purpose of connecting with Washington, as there are only a very few calls made to that city from points distant therefrom; and for the use of department inspectors Independent lines can furnish in most cases the same or better facilities than the Bell company, and in very many cases the only connection, for their use.

"Resolved, That the Michigan Independent Telephone Association vigorously protests against the unjust discrimination attempted to be practiced in this instance; and be it further

"Resolved, That the secretary of this association be instructed to send copies of this resolution to Theodore Roosevelt, president, and Henry C. Payne, postmaster-general; to each of the senators and to each member of Congress from this state; and be it further

"Resolved, That the executive committee be instructed to appoint a committee of three to have charge of this matter and cooperate with similar committees from other state associations."

A number of other resolutions of minor importance were adopted, after which the following officers were elected: President, E. B. Fisher, Grand Rapids; vice-president, R. B. McPherson, Howell; secretary, C. F. Brown, Alma; treasurer, R. F. Johnson, Saginaw.

The above officers and Wm. Robinson, Muskegon; W. O. Hunt, Adrian; J. Robinson, Benton Harbor; A. E. Palmer, Kalkaska; W. E. Wing, Grass Lake, constitute the executive committee.

After thanking the Citizens' Telephone Company for its hospitality the convention was declared adjourned.

APPLICATION OF TELEPHONE APPARATUS ON RAILWAY SYSTEMS.

BY A. J. FERGUSON.

The marvelous expansion of the vast and wonderful network of railway systems throughout the country, carrying with it as a necessary adjunct the development of the telephone, representing millions of dollars in investments in telephone properties alone, is a study of widespread interest to all classes.

Every progress in method must be seized and untilized at the earliest moment. A quick realization of the value of the telephone service to the railways was shown by the directors of the railway lines and it was speedily put in operation by the leading corporations. Everything that builds up a better railway service helps to increase traffic, and increased traffic means extension of systems, more business, greater earnings and bigger dividends for stockholders. Thus, when it became apparent that the telephone service was required for the aid of passenger and freight traffic, the managers appreciated the wisdom of providing it. As time progresses the service must be improved, and it will be the business of the corporation officers to adopt all the most modern methods known. This development of railway systems carries with it, of course, a utilization of the telephone, which brings at once instant communication along the lines.

Within the last two or three years the railway companies of the country have shown a decided inclination to apply the telephone to various uses in their business. The application of the telephone to railroad work began with the installation by railroads, in their groups of offices at the more important points, of private telephone exchanges. These exchanges eventually were connected by direct or trunk lines to the public exchanges of the telephone companies, and the railroad companies are now going a step farther by constructing telephone circuits along their rights-of-way and trunking their private exchanges together, thereby forming a complete intercommunicative telephone system over their entire system of railways, which telephone systems, at various points, as before stated, are accessible to and from the general public.

The railroad companies have found that the telephone can be applied to their various needs. It is possible for a higher official, through the medium of such telephone systems, to sit at his desk and hold conversation with any subordinate throughout the entire length of his road. They have found that it is a time, labor and money saver, as a means of quick personal communication to avoid many misunderstandings and delays incident to correspondence. Where a general manager can hold a personal telephone conversation with any one of his division superintendents, engineers and transportation or traffic men, it is no longer necessary that the time of these busy men be sacrificed in order to make trips hundred of miles to convey some specific information to their superior which he desires to obtain personally.

The telephone has proven of great value to the traffic branch of a railroad, as the various representatives of this department can, at any time and from any point, get into immediate communication with the departmental head for advice or instructions in any particular case.

Another great saving of expense to a railroad company is the quick means of obtaining information as regards supply of cars in order that a shortage may not result at some congested point.

Among the railroads that have shown the greatest advance in the use of the telephone, as applied to their needs, are the C., B. & Q., Illinois Central, Pennsylvania, New York, New Haven & Hartford, Delaware, Lackawanna & Western, and the Lehigh Valley. These railways have either the complete telephone installation above outlined throughout the entire length of their systems, or are rapidly completing the same, and the various other large systems of railways of the country are watching with interest the practical use of the telephone and are commencing work along the same lines.

Some of the railroads have gone so far as to extend telephone lines from their private exchanges through the signal towers along the various divisions of their systems, placing a telephone in each tower, thereby rendering, in case of accident, quick communication from the train to the dispatcher; or, if necessary, the division superintendent can go in on the line and talk with the conductor of the disabled train.

The railroads are in a very advantageous position to build telephone lines for their purposes, inasmuch as they already own rights-of-way and pole lines already constructed, and students of railroad telephonic development maintain that the country will undoubtedly see in the near future a remarkable development of the telephone by the various railroads of the country.

To still further enhance the value of the telephone in more economical and efficient operating of their systems, there has recently been developed telephonic apparatus which permits the utilizing of the railway telegraph wires for telephone service simultaneously with the telegraph. This apparatus is known as the "Railway Composite."

With this apparatus it is possible to carry on telephone conversation over a single grounded telegraph wire, say, between Toledo and Cleveland, with all intermediate telegraph stations cut in on the wire.

Of course, there is a limit to the length of the circuit and the number of intermediate offices to be bridged out to obtain satisfactory telephone service. This is determined, however, when the condition of the circuit as to conductivity and insulation is known and whether the circuit is copper or iron

It is also necessary that the voltages of the terminals of the telegraph wire be known, so that sufficient impedence may be inserted at terminal points where the telephones are to be connected. The impedence coil is designed to fulfill the function of so modifying telegraph impulses that the telegraph signals are inapparent in the telephone. It has the additional function of maintaining the efficiency of the telephone without interfering with the telegraph.

One side of the telephone circuit is connected with the telegraph wires through a condenser, the other side of the telephone circuit being grounded. Intermediate telegraph stations are equipped with apparatus which provides an independent path around the telegraph instruments for the telephone currents, either talking or ringing without an additional resistance or series connection being made in the telegraph wire. The especial feature of the railway composite is in the arrangement of the signalling apparatus whereby the bell in the telephone circuit will only respond to impulses of high frequency from terminal or intermediate offices and does not interfere with the telegraph signals.

This apparatus provides a means of quick communication between division officials, and intermediate freight agents, yardmasters, station agents, towermen, etc.

To obtain best possible service it is desirable that long lengths of single underground or aerial cable conductors be avoided in the assignment of circuits for the service. The reason for this is apparent, viz.: Resistance and increased induction, or noise in the telephone, from parallel telegraph wires of varying voltages.

The Railway Composite is to-day in successful operation on a number of the leading systems.

The most efficient type of composite apparatus in use on metallic circuits is that known as the "Symplex." See diagram No. 1, for connections.

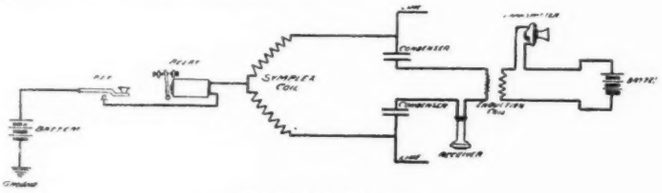


DIAGRAM NO. 1.

The Symplex system of simultaneous telephony and telegraphy secures one metallic telephone circuit, and one grounded telegraph circuit from one pair of wires. The telegraph circuit operates over the two wires in parallel, being connected thereto through a split coil whose function is to send half the telegraph current over each wire and to offer a great impedence to the telephone currents, so that the telephonic working shall not be impaired in efficiency. So far as the telegraphic working is concerned, the two line wires are at the same potential and bridged apparatus, without ground connections, receives absolutely no current from the telegraph battery.

Condensers are inserted in each side of the telephone loop to make the telephone metallically separate from the telegraph, and to facilitate the location of trouble and to prevent accidental grounds on the telephone loop from interfering with telegraphic working. The generated telephone currents arising in a metallic circuit and ground on the line or in the terminals have no effect if they occur at points midway in potential between the two wires. Consequently the symplex coil, whose two windings are equal electrically, prevents the telegraph grounds from affecting the telephonic balance. This coil is so wound as to prevent a maximum magnetic impedence to telephonic currents and a minimum impedence to telegraphic currents. The condensers in the telephone loop are not inherently necessary. It is possible to ring over this circuit for telephone operating purposes in the usual manner if the ringing generator is grounded; if the generator is grounded a repeating coil is necessary between the ringing key and the condensers to preserve the complete independence of telegraphic and telephonic working.

Intermediate stations employ apparatus of the same character as that at the terminals; this is readily seen from the circuit diagram. The intermediate stations may be telephonic or telegraphic only, or both.

The advantages of this system are absolutely independence and immunity from mutual disturbance between the telegraphic and telephonic circuits. When there are no intermediate stations, the service, of both characters, is essentially the same that would be obtained over the line for service of either character alone. Intermediate stations slightly impair the efficiency of the service, but many such stations are necessary to produce a noticeable loss of efficiency as compared with the same line and the same number of stations without the symplex system. Another type of Composite apparatus is that shown in Diagram No. 2.

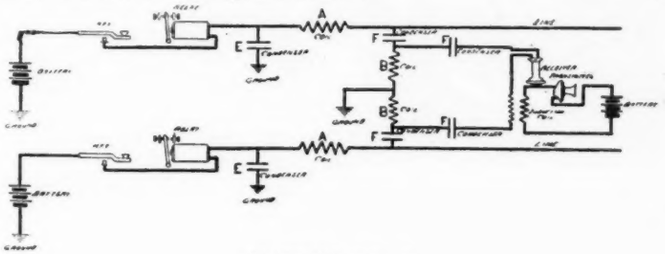


DIAGRAM NO. 2.

The early system of Van Rysselberger for simultaneous telephony and telegraphy over a single wire grounded circuit may be extended, with slight modifications, so as to secure two grounded telegraph circuits over a metallic two wire telephone circuit. The standard system which accomplishes this is shown in the circuit diagram. The grounded condensers E and the coils A have the function of rendering the otherwise sharp and abrupt telegraphic impulses of such a sluggish and relatively slow nature as to make their audibility in the telephone negligible. The condensers F preserve the telephone loop metallically separate from the telegraph circuits. The coils B are to prevent cross fire between the two telegraph circuits, through the telephone loop —the ground between the coils shunting all the momentary cross impulses, through the condensers, to ground.

It is not possible to ring over such a line with the ordinary hand or power generator ringing current. Means have been found, however, which employ a high frequency alternating current of low voltage to ring without interfering with the telegraph. One of these means has been used in the Railway Composite.

Intermediate stations on the Standard Composite employ substantially the apparatus whose circuit is given above; this permits the use of telegraph repeaters.

The telegraph impulses can be distinguished very faintly in the telephone, but can never be read. Low insulation of the line renders the telephonic disturbance, due to the telegraph, somewhat louder.

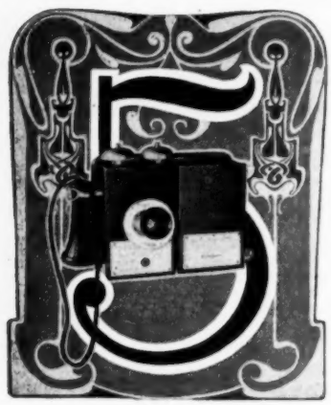
This system has the advantage over the Standard Symplex of furnishing one more telegraph circuit, and consequently increases the earning capacity of the plant to a maximum when we disregard the Railway Composite.

To summarize:—The Symplex furnishes two phantom circuits on one pair of wires; the Standard Composite furnishes three phantom circuits on one pair of wires, and the Railway Composite furnishes two phantom circuits, on one wire, or four on two wires.

According to the most recent statistics there are, in Russia 103 telephone plants, of which 91 belong to the government and 12 to private companies. The total length of the telephone conductors was 70,031 wersts. The number of subscribers was about 40,000. The telephone line from St. Petersburg to Moscow, was used by 592 subscribers.

Measured Telephone Service

HAROLD D. STROUD



-CENT, or token, service is so thoroughly practical that it will certainly play an important part in the future development of the telephone industry. If by the introduction of measured telephone service, the traffic of the lines can be reduced fifty per cent, operators ordinarily having 100 lines to operate could handle 200 lines, and as the reduction of traffic promises to be even greater than fifty per cent, an operator should be able to give better attention to 200 lines than she previously could have given to 100 on flat rate.

Taking the above as a safe basis of computation, we note what the effect on the switchboard will be. If one operator can ordinarily handle 100 lines and there are 9,000 lines in an exchange, ninety operators' positions are required, and as each operator must be within reach of every line in the exchange in multiple practice there must necessarily be thirty complete multiples of the calling jacks. We will relieve these 9,000 lines of the deadhead and unnecessary calls by requiring a small charge per each call, and assuming that we get a fifty per cent reduction on the traffic as the direct results thereof, we are enabled to do the work with one-half the operators by giving each operator 200 lines instead of 100.

This means that we have one-half of the operators' positions vacant and longitudinally one-half the multiple and answering-jack space available for extensions. Of course the capacity of the multiple area may set a little against giving the full benefits of this process of doubling the number of lines before each operator, but here we have recourse to the party line. If a new exchange were being built to accommodate an ultimate of 9,000 lines on this plan, but forty-five operators' positions would be required instead of ninety, and therefore fifteen multiples of the calling jacks instead of thirty. The cost of this board would be less than one-half of that needed to handle the number of lines on flat rate and it logically follows that the investment, not only in switchboard, but in real estate as well as interest, depreciation, cost of supervision, light, heat and all other items of expense, will be reduced in proportion.

Taking now into consideration the means of handling: Recent improvements in devices for keeping records of measured service calls have simplified the process greatly. In the latest development of such devices all the extra work required on the part of the operator is to press the button associated with the answering cord to return the coin previously deposited in initiating a call, or to credit a call registered by the subscriber in getting central. This operation is required only when the call initiated is unsuccessful. In the flat rate system, this percentage is higher than it is in the measured service system. In the former, the general average of "busy," "can't raise" and "out of order" calls would run between ten and fifteen, but as the percenatge of measured service in any system is increased, having the effect of decreasing the abnormal traffic, the first two elements going to make up the unsuccessful calls are proportionately reduced, and in an entirely measured-service system where double-track service is worked in the branch exchanges, and auxiliary service is furnished where many "busy" calls are had, it is the writer's opinion that the percentage of unsuccessful calls could be reduced by a careful nursing of traffic conditions to three or four per cent. Such a reduction of unsuccessful calls, taken together with prompt answering on the part of the operators, would have a noticeable effect upon the character of the service.

When we analyze the average subscriber's impression of the telephone business in general, we must ignore the technical side of the business and look at it from the subscriber's point of view. The subscriber cares not to what expense the company has gone to build up a system. Neat outside construction and the absence of scattered wires and leaning poles has a moral effect upon the community, but the average subscriber cares only for results, and the whole enterprise to him is just that little portion which makes some direct impression upon his sensibilities. The first thing that impresses him is the instrument itself as he sees it upon the wall or desk. If it is neat and pleasant to the eye his impression thus far is favorable. If when he removes the receiver from its hook the response is prompt and without any unpleasant properties such as the terrific snap so characteristic of some systems, and if the "number, please," or simply "number," is spoken in a pleasant tone, thus far it is well. The visual and aural sensibilities have been satisfied. Now comes a period when the service tells—a prompt response from the proper party—and, well—"all's well that ends well." Good service expresses the thought. The patron who is thus served 95 times in 100 calls will need no soliciting when he requires more service.

The length of time consumed in the average telephone conversation does not exceed two minutes. It has been estimated by some at one minute and a half. Taking the two-minute basis in order to be conservative, ten calls per day would mean that the line would be in actual use for outgoing service twenty minutes in twenty-four hours. We will presume that for each outgoing call there is also an incoming call. This would double the time, or forty minutes would represent the actual time the average line was in use in twenty-four hours. From a traffic basis this is good service. Then if measured service will cut down the traffic to five calls per day, the line would be in use only twenty minutes in twenty-four hours, and two stations could be served on that line with just as good service as was given on a flat rate line at ten calls per day. There is a large number of families who would not care to use a telephone more than twice a day and would not pay as high a rate as the party who would use it ten or fifteen times. In other words, they could not afford the price which the other party who has more use for the service is willing to pay. This class of people (and they will be found to constitute the majority of residence patrons), would not object to being on a party line if they would not have to bear a guaranty of over two calls per day. They get their incoming calls free because the one who is calling them pays at the other end. The need of the telephone will more than pay for the price of the service.

On party line measured service it has been found that one nickel a day is very profitable. Six parties could be served in a residence district on one circuit and the traffic would not be such as to cause anyone to complain about poor service provided the outgoing traffic did not average over twelve calls per day on each line. This statement is not the result of any conjecture on the writer's part, but

that of actual demonstration. Selective ringing, while not essential to this class of service, can be provided.

There are several efficient forms of selectors now in use for ringing on party lines up to four parties. The Bell company has a system working on the polarity principle, which is familiar to most of us. Two parties may be bridged off of each limb of the line by the use of biased ringers. One party on each limb will be rung with a negative current, the alternate bell being muted while the positive current, if sent out, will ring the other bell and mute the one previously rung by the negative current. By using each limb of the line by ground return, as a separate signaling circuit, a combination of four parties can thus be rung selectively. The Dean selector, which is a modification of the original harmonic principle, has been in very successful use from reports the writer has been able to obtain, in a number of large exchanges in this country during the last year.

There is another selector which has been in quite extensive use depending upon the step by step principle. It is the invention of J. J. Comer, previously of the Chicago Telephone Company, now consulting engineer for the Maryland Telephone and Telegraph Company. This device seems to be a defiance of all precedents set by those working along the step by step line, and without regard to what has been done in the past, Mr. Comer seems to have succeeded in devising a selector on the step by step principle that embodies many advantageous features not found in some other forms of selectors. For instance, the cross ringing when the party signalled removes his receiver before the operator releases the key. In using ground as a common return and both limbs of the line as individual paths, that objection is likely to arise, because the removal of the receiver while the operator is ringing on the one path, causes the current to pass over into another path and affects the bells on the opposite limb of the line, which are attuned to respond to that particular polarity or frequency of current.

In Mr. Comer's system all bells are bridged either from one limb of the line to ground or between both limbs of the line. Two polarities of current are used, but for a different purpose than in the first selector referred to. One polarity is used to step a pair of contacts on each selector head. If it is desired to ring the third party, the third step will bring the contacts of that particular station into alignment. Then by pressing the button supplying the opposite polarity of current, the operator may ring that particular party, while all other selectors will be restored by gravity to their normal positions. The simplicity of the cord equipment of the operator's position in this system commends itself to not only small exchanges, but to large ones as well. Two buttons are all that is necessary on a key shelf, one to step up and the other to ring and release. The power equipment is merely two sets of dry batteries, one for each polarity of current.

Another advantage of this system is the fact that if one party on a party line calls another whom the operator may find is on the same line, she does not request him to hang up his receiver so that she can ring, but simply removes the answering cord, inserts the calling cord and rings with the receiver off. This feature is also an advantage, because should a subscriber forget to hang up his receiver, the operator may ring him nevertheless. If it is desired to add more than four stations on any line this system does not require any changes of the cord equipment to ring them. Ten parties can be rung selectively with practical results. This system has been in use in Baltimore for over a year, and from the reports of the Maryland Telephone Company, is giving excellent satisfaction.

Another system is the Leich selective system for four-party lines. It is the invention of Oscar Leich. This system has been in extensive use during the last year and very favorable reports have been given of it. The principle of this system so far as the disposition of the signaling circuit is concerned, is similar to the first system mentioned, where two bells are bridged from each side of the line to ground. This has the advantage of saving current because a condensor may be used in series with the bell. Alternating is used, instead of a pulsating, as in the former case. While this is not, strictly speaking, the harmonic system, yet it resembles that system somewhat. The basis of operation of of this system is the principle of frequency. The current of one frequency will ring one bell and mute the other, while a high frequency will have the opposite result.

There has been much talk of a lock-out system on party lines and much experimenting done in that direction, but the complex apparatus and circuit conditions necessary to successfully operate such a device so far as past experience is concerned has been found to be such as to make the cost of equipping and maintaining these circuits prohibitive in view of the fact that party line service must be sold cheaply. People who wish to take advantage of the low rate of telephones are usually that class of people who have time to make a personal call when they have any important secret business to transact. On the other hand, if secrecy is essential to their telephone transactions they are usually quite able to pay the price asked for that individual line. However, it is quite possible that someone will find a way to furnish a lock-out principle that is in accord with conditions. In spite of the economic phase of the question no one would deny that a lock-out party-line system requiring few parts and simple construction would, if it did not impose extra maintenance features, be another step toward perfecting telephone apparatus.

There has been a decided inclination toward using the telephone to carry out in a different way for local business the principle employed by the large mail order houses. Some provision supply houses have gone to the extent of renting telephones for their customers and paying the entire rental. As such a system has been able to exist for several years, it seems reasonable to assume that it has paid. If it has paid any firm to furnish a telephone on this basis it seems reasonable to assume that a concern so organized would be able to meet the guaranty of four or five cents a day for any number of telephones in a locality supplied by them. Such houses spend more than five cents a day, on an average, in other kinds of advertising for every customer on their books, and then do not get their entire patronage. A provision concern might order 500 nickel telephones put in for as many customers, agreeing to guarantee the telephone company, say, four cents a day for each telephone. This guaranty could be made by purchasing from the telephone company tokens at the rate of $4 a hundred, furnishing about twenty-six a month to each customer. If the customer used them all in one month, or about one a day, an equal number would be supplied the following month. If the customer used but twenty, a like number would be supplied the following month. These telephones could be put on four or six-party lines, and the telephone once being in the subscriber's residence, would be used by him and a nickel deposited for many other calls than those to the supply house. He would also have use of the telephone for incoming service, which would be appreciated. This is but one of the plans which are feasible in a measured service system, and no doubt there are many other plans which might be carried out successfully along commercial lines, which would eventually make it possible to place one telephone in profitable service for every five inhabitants in a city.

Development of the telephone business offers greater possibilities than has yet been heard of, but it seems most logical that the ideal system will require each man to pay for his own service in proportion to the service rendered, whether he has his own telephone or uses that belonging to somebody else.

DECISIONS AFFECTING TELEPHONY

BY G.W. HAND

VALIDITY OF LICENSE TAX ON POLES AND WIRES.

SINCE the borough of New Hope, Pennsylvania, in January, 1899, acting under the power given by an ordinance, has assessed a license tax of $1.00 for each pole and $2.50 for each mile of wire used in the borough by the Postal Telegraph-Cable Company, amounting to $552.00, payment has been refused, and the borough thereupon brought suit for the above amount. The case was tried in the court of common pleas, the superior court and in the supreme court of the state, and at each trial the decision was against the company, which, as a last resort appealed to the supreme court of the United States. The judgment which the jury gave against the company at the trial in the court of common pleas was for $466.40, which it will be noted was considerably less than the full amount which the borough claimed. This fact that the jury awarded an amount less than the full amount claimed, singularly, was directly responsible for a reversal of the judgment in the United States court.

In the court of common pleas the borough justified its assessment of the tax on the ground that it was endeavoring to collect the same as a mere license fee which was to be applied in covering the cost of the inspection of the company's poles and wires, and that in no sense was the sum assessed collected for the purpose of raising a revenue, and that the amount collected was the actual expense to which the city had been put in so inspecting the company's properties. The company in defense denied these facts, particularly as to the allegation that the tax was proportionate to the expense of the inspection. Evidence was introduced on this point by each of the litigants, and on being referred to the jury judgment was rendered for the amount above stated. The supreme court of the United States on reviewing the case took this fact to be clear proof that the company's defense as to the reasonableness of the tax was well founded and reversed the decision of the state courts, saying:

"The verdict was simply evidence of what the jury considered a reasonable sum. But neither the court nor the jury had any power whatever to give judgment for what either might regard a reasonable sum, if that sum were less than the amount provided for in the ordinance. The source of jurisdiction to give any verdict or judgment for the borough was the ordinance. If the amount of the license fee provided for therein was unreasonable the ordinance was void and there was no power in either jury or court to substitute its own judgment as to what was reasonable and to give a verdict or direct a judgment to be entered for that sum. Finding the sum named in the ordinance unreasonable, the verdict or judgment should have been for the company."

From this statement of the court the principle is easily deduced that ordinances of this class in Pennsylvania are only valid when they assess an amount which is fairly proportionate to the *actual cost* of inspection under the police power; if any sum is assessed which is grossly inadequate to the actual expense to the borough, then the ordinance is void. When the assessment is of the nature of a tax for revenue it is void.

Postal Telegraph-Cable Company v. Borough of New Hope, 191 U. S. 204, decided January 4, 1904.

A SIMILAR CASE.

Another case decided by this court on the above date in which the same company was sued by the borough of Taylor, was also decided in favor of the company on practically the same grounds. This borough had passed an ordinance similar to the one of New Hope and claimed $220.50 as the amount which the company should pay as its license tax under the ordinance. The ordinance, as in the former case, applied to all telegraph, telephone and electric light companies having poles and wires in the borough. As in the former case, the company alleged that it was doing an interstate business and had paid all state taxes and was therefore not liable for this license fee, which it alleged was grossly out of proportion to the actual expense of inspection; that the tax was not in fact a license fee, but a tax for revenue. The company introduced evidence that the borough had merely imposed the fee under cover of its authority to collect a license fee, when, in fact, it had made no inspection whatever and was merely collecting revenue. This evidence was conclusive against the borough and the supreme court said that on this ground the license fee was unreasonable and that the ordinance was void.

It will be noticed, however that in these two cases the courts of last resort have not decided that the principle of an ordinance of this character is not well founded in law, and that in each case the decision was on the ground of the reasonableness thereof. Many telephone and telegraph companies have awaited the decision in these cases with interest, and it was first thought that they were favorable to the companies, and they were as to the immediate ones concerned, yet in a general way they implied that boroughs have this authority to impose this character of license fees and practically leave the only question of their validity to be decided on the ground of the *reasonableness* of the same. The following quotation from the reported decision is pertinent:

"When we come to an examination of the grounds upon which this kind of tax is justifiable, and when we find where in cases each one of those grounds is absent, how is it possible to uphold the validity of such an ordinance? To uphold it in such a case as this is to say that it may be passed for one purpose and used for another; passed as a police inspection measure and used for the purpose of raising revenue; that the enactment as a police measure may be used as a mere subterfuge for the purpose of raising revenue, and yet because it is said to be an inspection measure the court must take it as such and hold it valid, although resulting in a rate of inspection which, if carried out throughout the country, would bankrupt the company were it added to the other taxes properly assessed for revenue and paid by the company."

Postal Telegraph-Cable Company v. Borough of Taylor, 191 U. S. 208. Decided January 4, 1904.

FAILURE TO COMPLY WITH CITY ORDINANCE.

The telephone companies of Pennsylvania had their full share of litigation during the first month of the year, and the results have not been altogether satisfactory to them. January 15 the Supreme Court of the state gave its opinion in the case of the city of New Castle against the Central District and Printing Telegraph Company, in which the company had been enjoined against erecting poles on North Jefferson street of that city, without the consent of the proper city authority. The supreme court, through Judge Mestreazat, gave the opinion in which it holds that the city enjoining the company against erecting the poles on this particular street was not interfering with or abridging the charter rights of the telephone company to carry on the business of maintaining and opeating telephone lines within the city. The plaintiff, however, contended in asking for this injunction, that it had authority to regulate and supervise the erection and construction of the defendant's lines of telegraph and telephone poles upon the streets of the city, and that the general ordinance of June 6, 1899, is a valid exercise of that authority and infringes none of the rights granted the companies by its charter. This ordinance provides, among other things, that the corporation may apply to the council to have its poles erected and that the council may thereupon designate the erection of each pole or authorize the street committee or city engineer to make the erection thereof. The ordinance of April, 1882, under which the company was proceeding to erect its poles, required them to be placed under the supervision and approval of the engineer and the company claimed that it had received his approval. In former cases, the courts have held in this state that a municipality may provide by reasonable regulation the manner in which telephone companies may enter upon and occupy city streets, and the rights of the company under its charter by these decisions are subordinate to the authority of the municipality to regulate the placing of the poles. The ordinance of 1899, according to the decision of Judge Mestreazat, does not prevent the company from placing its poles on the streets or impair its right so to do, and therefore the ordinance was valid, and that in the erection of the poles complained of by the city the telephone company had not complied with its provisions, and hence the injunction was properly granted. In the course of the decision the judge said that there was ample authority in the court to protect the company from any infringement of its charter rights by the city, and while the company must erect its poles in new locations under authority from the council, yet should the city authorities refuse to give new locations or approve of those chosen by the company, the court would interfere and protect the company's rights. The ordinance of June 16, 1899, according to this opinion, is not in any way prejudicial to the charter rights of the company, and the court sustained the municipality in enforcing the same. The company must, therefore, apply to the council for its approval of the location of new poles.

New Castle v. Central District and Printing Telegraph Company, in Supreme Court of Pennsylvania. Injunction sustained January 15, 1904.

CANNOT ASSERT EMINENT DOMAIN IN PENNSYLVANIA.

Judge James A. Beaver, of the superior court at Scranton, Pennsylvania, recently decided a case which at this time it is not necessary to cite, in which the court holds that the act of the legislature of 1874 did not confer upon telephone and telegraph companies the right of eminent domain in definite terms, and that it was not the intention of the legislature by the act to confer upon them this power. The result of this decision is to fix the law to be that companies may not occupy public highways without the consent of the abutting owners. In the opinion construing the act it is asserted that when a public highway is laid out through private property the land remains the property of the previous owner. The public use for which the land is taken is the only purpose for which it may be used, namely, that of a *public highway*, and any further rights of use of the same by telephone companies must be obtained from the abutting owner. He is only deprived of ownership in so far as public utility may require of the property as a public highway. While telephone companies are quasi-public corporations, according to the law in this state, the public character of them does not go so far as to include the right to assert eminent domain along the public highways of the state, and whenever they proceed to the erection of their lines they must first secure the right of the abutting owners under penalty of a suit in damages by the owner to recover compensation for the same.

The proper course for the companies operating in this state to pursue is to secure by legislative enactment a statute conferring this right to assert eminent domain in erecting their lines along public ways. The law as laid down by this court is the same as that which the Kansas courts have recently declared. It would seem advisable that the companies in some way co-operate to bring the matter to the attention of the legislatures, and if possible secure such legislation. The outcome of the ruling, as to the law as declared by the courts at the present time to be, may be very disastrous to telephone companies.

JUDGMENT HAS BEEN AFFIRMED.

The court of appeals of Kentucky, through the opinion of Associate Justice Nunn, has affirmed the judgment obtained by the Richmond Telephone Company against the Bastin Telephone Company for damages for failing to comply with the contract to build a part of a telephone line from Lancaster to Richmond. The Bastin company sold its line to the Cumberland Telephone Company, and the work contemplated in the contract between the former companies was abandoned.

Bastin Telephone Company v. Richmond Telephone Company, in Supreme Court of Appeals, decided December 17, 1903.

JUDGMENT FOR INJURY TO SHADE TREES.

A case recently decided by the New York courts in which one, Ruben L. Miller, of Lowville, of that state, recovered a judgment of $264.50 against the Black River Telephone Company for injuries which he alleged had been done to his shade trees by the company while it was erecting a line of telephone poles in front of his residence, is but another of a long series of cases in which companies have been defeated in their efforts to escape liability from the owners of trees which the companies have been forced to mutilate in erecting their lines. In this case the company succeeded in securing a disagreement at the trial before a jury in the justice court, but at a second trial the jury rendered a verdict in favor of Miller, and this decision was sustained in the county court, and also in the appellate division. The case is similar to that of Bronson v. the Albion Telephone Company which was recently decided in Nebraska, and in which the owner of the trees secured a verdict against the company. Plainly, there is no foundation in law upon which a company may defend an action of this character and this decision is but another example to show the wisdom of obtaining settlement in such cases with the owner, rather than by appeal to the courts. The mere fact that the injury is through necessity is no defense to an action. If there is an injury the person upon whom it has been inflicted is entitled to a remedy and the courts have almost universally said that in the instance of an injury to shade trees the property owner is entitled to damages. Judging from the number of cases of this character, telephone com-

panies, while being forced as a necessary incident to the erection of their lines to oftentimes trim and otherwise mutilate shade trees, show a disposition to go to trial in courts of law to settle with the owner of the trees, but the decisions show in almost every case that the companies are worsted in such lawsuits, and while it is not within the province of the editor of this department to offer advice along this line to its readers, he is constrained in this case to call attention to the general outcome of this class of litigation.

Miller v. Black River Telephone Company, appealed from Lewis County Court, New York, decided January 17, 1904.

MUST PAY LICENSE TAX.

In the September, 1903, TELEPHONY, the noted case of the city of Philadelphia against the Atlantic and Pacific Telegraph Company to collect license fees on poles and wires was discussed, and it will be remembered that it was there stated that the supreme court of the United States had affirmed the decision of the lower courts, declaring the ordinance assessing the tax valid. The two cases against the Postal Telegraph Company, which are noted in this issue, and which were both decided against the municipalities on the ground that the taxes were unreasonable, gave an impetus to the Atlantic and Pacific to endeavor to open the case and resist the collection of these taxes, and as the fees which the city of Philadelphia had assessed against this company were the same as those assessed by the borough of Taylor, it was thought that the courts would also in this case decide against the reasonableness of the tax. This ordinance applies not only to telegraph companies but to telephone companies as well, and there was a mutual interest in the effort to secure a reversal of the judgment in favor of the city. Accordingly, a motion was made before Judge McPherson of Philadelphia, to grant a new trial on the bases of these recent decisions, which he refused to grant. This practically puts at rest all hope of avoiding the payment of these assessments. The result is far reaching and establishes the right of municipalities in Pennsylvania to collect fees of this character.

Atlantic and Pacific Telegraph Company v. City of Philadelphia, motion for new trial denied January 20, 1904.

FINED FOR SWEARING IN TELEPHONE.

At East Chicago, Ill., on January 17, a rich New Yorker named David Tuska became enraged at a telephone operator who had notified him over the telephone that a certain toll call was twice the actual rate, and swore at the operator and became generally insolent. The operator also grew indignant and after notifying the police had Tuska arrested on the four charges of profanity, provoke, assault and battery, and disturbance of the peace. Tuska pleaded "not guilty," but the jury found him so after a twenty-four-hour trial, and Judge U. C. Reiland imposed a heavy fine as the punishment.

SUBSCRIBER BEATEN IN SUIT AGAINST COMPANY.

The Rushville Co-Operative Telephone Company, which is organized under the laws of the state of Indiana, at the time of its organization adopted the plan of allowing patrons who desired telephone service to become stockholders, to purchase and to own their own telephones, and to string the wires themselves from the location of their telephones over the company's wires and poles to the central exchange and to pay a rental each month of a sum sufficient to pay the operating expenses of the company. Rule 13 of the by-laws of the company provided as follows: "All moneys due this company or its toll-line connections shall be payable at the office of the secretary on or before the fifth day of the month succeeding the mtaurity of such indebtedness, and if not paid on or before said date, the service of such delinquent shall be discontinued until the payment of such indebtedness." July 20, 1898, Arthur B. Irvin, a lawyer of Rushville, was owing the company for rental of his telephone service to the amount of $1.05. He was a stockholder in the concern to the extent of one share and had strung his wires and purchased his telephone according to custom and was paying the company for service for an amount sufficient to cover the cost of management. Irvin at the above date claimed that the company was his present debtor to the amount of $1.50 on a claim which one of his clients had assigned him and when the company's representative came around to collect the $1.05 Irvin refused to pay it, claiming that the company owed him over and above this amount the sum of forty-five cents. The telephone company thereupon cut off his telephone connection and Irvin brought suit under the state statutes (sections 5529, 5512 of Burns Rev. Statutes of 1901) for the recovery of penalties aggregating $1,000, which these statutes provide for in the case of discrimination by telephone companies between subscribers. Irvin claimed that in addition to the fact that the company was indebted to him over and above the amount claimed for rentals that there was an action lying against it on the ground that the rule which the company had applied against Irvin in cutting off his telephone service was at that date unapplied in the case of thirty-five other subscribers and that there was discrimination as a result against him, whereby he was in a position to invoke the protection of the above statutes.

The case while involving a trifling sum of money brought out several rules of law applicable to telephone companies which the courts before which the case was tried clearly laid down. Judge Douglas of Rush county gave judgment in favor of the company which was sustained on appeal to the supreme court, where it was said that Irvin was not entitled to the penalties provided by the statutes owing to his failure to pay the tolls and that the mere failure of the company to settle the alleged claim of Irvin's was not a reason whereby Irvin could refuse payment thereof; that the company had full authority to apply rule 13 and that "considering the quasi-public functions of corporations like the one at bar—corporations whose first duty is toward the public whom they serve—we think that their revenues should not be depleted by the furnishing of service to individuals who refuse to pay because they are asserting collateral demands against it."

The syllabus of the court reporter points out the eight rulings of the supreme court very clearly and they are of such practical importance that they are quoted in full below:

1. "Wherein an action against a telephone company for refusing to furnish plaintiff with switchboard connections, the complaint did not allege that there had been any discrimination against plaintiff's business, it did not state a cause of action within Burns' Rev. St. 1901, sec. 5529, providing that no telephone company shall discriminate against any individual or company engaged in any lawful business."

2. "A rule of a co-operative telephone company that all moneys due from its patrons for toll-line connections are payable on or before the fifth of the month succeeding the maturity of the indebtedness, and, if not paid, the service of the delinquent patron shall be disconnected until the indebtedness is paid, is a reasonable regulation, which the company is entitled to enforce."

3. "Where a telephone company had promulgated a rule that claims for service must be paid on a certain day on pain of having the patron's service refused, and the patron was charged with notice of the rule, and with the fact that he had violated it, the telephone company was justified in refusing service without informing him at the time of its refusal or the reason therefor."

4. "Where a telephone company had made such a rule the mere fact that the company had not enforced such rule against third persons for noncompliance therewith did not deprive the company of its right to enforce the rule against plaintiff."

5 "Where such a rule was in force the company was entitled to enforce payment of dues and tolls by denying service, regardless of the fact that the subscriber claimed that the company was indebted to him to an amount exceeding the tolls due."

6. "Where, in an action to recover a statutory penalty against a telephone company for cutting off plaintiff's service for its failure to comply with a rule requiring payment of past tolls on a particular day, the complaint alleged that the rule had not been en-

forced as against 35 other patrons of the company who 'were in like situation with the plaintiff,' but did not allege that such other patrons were in default, or had refused to pay, it was insufficient to show a discrimination against plaintiff in the enforcement of the rule prohibited by Burns' Rev. St., sec. 5529."

7. "Plaintiff owned stock in a co-operative telephone company, together with his telephone instrument and his line of wire to the exchange. Plaintiff was entitled to exchange connections on payment of certain tolls, and was subject to a rule providing that the company might discontinue connections for failure to pay past tolls on a specified date. Plaintiff, claiming that the company was indebted to him in excess of tolls claimed, refused to pay the tolls, and his service was discontinued. Held, that such discontinuance did not deprive plaintiff of his property without due process of law."

Irvin v. Rushville Co-Operative Telephone Company, decided by Supreme Court of Indiana, December 16, 1903, 69 N. E. Rep. 258.

TELEPHONE COMPANY SUSTAINED IN SUIT AGAINST SUBSCRIBER.

On January 15 the four justices of the peace of Detroit in the test case of the Co-Operative Telephone Company v. Peter Katus, a subscriber, gave a judgment in favor of the telephone company for $100. The suit is one of seventy which the company might bring on similar grounds to collect rentals and will be immediately appealed to the circuit court and from thence to the supreme court for final adjudication.

Co-Operative Telephone Company v. Katus, in Justice Court, Detroit, decided January 15, 1904.

GLOOMY OUTLOOK FOR THE MINORITY STOCKHOLDERS.

The only way in which the minority stockholders of the Michigan Telephone Company can now prevent the properties of the company from being turned over to the full charge of the bondholders who purchased them at the foreclosure sale is to deposit $5,000,000 as a guarantee fund pending the settlement of the appeal to the higher courts of the validity of the sale, which Judge Swan recently confirmed. The possibility of this being done is very small and in fact the new company has been partly organized with W. C. McMillan as the new manager, showing the intention of the men interested to treat the sale as final. The minority interests have the future redress of a suit for damages in the event that they win, which is very doubtful, considering all phases of the question.

MUNICIPALITY INTERFERED WITH ERECTION OF POLES.

By its charter provisions the Pennsylvania Railroad Company was given authority by the state to erect a railroad through the borough of Lilly and to maintain whatever other fixtures were necessary to maintain and operate the railroad in the different localities in which it was to pass. Under this authority the above corporation built the New Portage railroad and erected a line of telegraph poles thereon which line passed through the borough of Lilly and on one of the principal thoroughfares thereof. The line of poles had become defective and the company accordingly got leave from the municipal authorities and removed them, intending to erect new ones in their places. The borough objected to the erection of poles unless the railroad would comply with certain conditions which the municipality sought to impose before granting the authority. The railroad company refused to comply and applied to the court of common pleas of Cambria county for an injunction to prevent the borough from interfering. The injunction was denied on the ground that there was not sufficient evidence that the company intended to use the line of poles exclusively for railroad purposes, the court saying that inasmuch as it had failed to find as a fact that the railroad company was desirous of erecting a line of poles and wires for the exclusive use of its railroad line on and along the New Portage railroad, in the borough of Lilly, the answer of the municipality to the prayer for the injunction having raised the question and no evidence whatever being introduced to show that the line was for the use of the railroad company in the operation of its line of railway, it was constrained to refuse the prayer of the petitioner for the injunction. The case was then carried to the supreme court of the state, which reversed the finding of the lower court and made an order that the municipality refrain from the proposed interference. There had been no dispute, but that under its charter the railway corporation had the authority to erect the line of telegraph and the higher court said that the purpose to which the line was to be put was out of the question entirely. If the authority existed to erect the line at all there was implied authority that the railroad could use the line for any purpose which it might choose. The application of this decision in a general way gives railroads the authority to erect lines of telephone or telegraph on their premises for any purpose providing the right to erect them at all may be inferred from their charter rights.

Pennsylvania Railroad Company v. Lilly Borough, decided November 9, 1903. 56 Atl. Rep. 412.

ARE TELEPHONE COMPANIES COMMON CARRIERS?

In the November, 1903, TELEPHONY, attention was called to an order of Judge Artman of the Boone circuit court of Indiana, granting a temporary mandamus to the Thorntown Co-operative Telephone Company to compel the Lebanon Telephone Company to grant the complainant the right to use defendant's switchboard connections at Lebanon. The defendant company had previously entered into a contract with the Thorntown company whereby it had agreed to give the latter company exclusive service between Thorntown and Lebanon over its lines. The complainant company secured the order for the mandamus on the alleged state of facts that telephone companies are common carriers in the same sense that railroads and other related concerns are, and that this being the law, that the Lebanon company could not grant any such exclusive rights to the prejudice of other competing companies. The defendant answered that to comply with this demand that it would be compelled to break its contract with the third party. On the showing made at the original hearing the mandamus was granted and the case recently came to trial on the merits of the facts in deciding whether the mandamus should be permanent. The real question in controversy was whether in fact telephone companies are common carriers. From the bill of complaint the judge had decided that they were, but after the trial this decision was reversed, and a special finding was made that the law of common carriers does not apply to this class of corporations. Judge Artman's decision coming from a court of inferior jurisdiction, the question is yet open for further adjudication in the higher courts. An appeal of this case is contemplated, but as yet no formal announcement of this purpose has been made. If the higher court should hold that telephone companies are common carriers, any company could compel every other to give switchboard connection and transmit messages the same as railroads may compel other lines to carry baggage beyond their terminals.

Thorntown Co-operative Telephone Company v. Lebanon Telephone Company, Mandamus denied, February 22, 1904.

COMPANY TO OBTAIN RIGHTS BY MANDAMUS.

The city of Owatonna, Minnesota, has trouble in store as a result of a recent mandamus proceeding brought by the Tri-State Telegraph and Telephone Company to compel that municipality to designite on what streets the telephone company may erect its lines of wires and under what conditions it may operate. The company alleges that the city is showing favoritism towards the Northwestern Telephone Exchange Company, which already is doing business in the city by delaying the former company's request that the city give it permission to also come into the city as a competitor.

Concerning Electrical Condensers

CHARLES H. COAR

Condensers are made possible by the fact that every insulated conductor of electricity is capable of retaining a charge after it has been subjected to an electro motive force. This is illustrated by the discharge or kick given back by cable conductors after they have been subjected to an E. M. F.

It is well known that no charge exists by itself; that there is always an equal and opposite charge induced by it upon neighboring bodies, and also that unlike charges attract and like charges repel. The action of a magnet upon surrounding magnetic substances will make these facts evident.

The following experiment will possibly cause the action of a condenser to be better understood.

If one terminal of a battery or any other source of E. M. F. be connected to the ground and the other terminal be connected to a metallic plate, which is insulated from surrounding bodies, a charge will flow to the plate until it is of the same potential that the terminal is. Being the same as the terminal, it may be either positive or negative.

If a similar uncharged plate is now brought near the charged plate, a charge will be induced into that side of the uncharged plate nearest the charged one, which will be equal and opposite the charge held by the charged plate. The opposite side of the uncharged plate will have a charge similar to that held by the charged plate, as shown in Fig. 1.

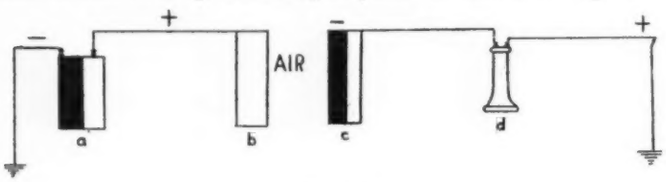


FIG. 1.

In the diagram, a is the source of current, b is the terminal plate, and c is the uncharged plate. The receiver d is cut in series to the ground in order that the discharge of plate c may be heard.

Now connect the ground terminal in the plate c and the positive + side will discharge itself, while the negative — charge will be attracted by the positive + charge in the plate b. Thus a discharge has occurred from the plate c to earth, although this plate has had no actual connection with the source of current. This action between two insulated bodies is termed electrostatic induction.

One of the simplest forms of the condenser is the Leyden jar, which contemplates a glass jar with a coating of tinfoil applied both inside and out, extending from the bottom to within two or three inches of the opening.

A chain or rod is used to lead the charging current to the inside coating, which in turn charges the outside coating with a similar but opposite charge, as previously explained.

The inner coating will receive a much greater charge with the outer coating in place than it would without it. After charging the jar one can receive a discharge by bringing the inner foil in contact with the outside.

The insulating medium between the plates of a condenser is the dielectric, and the amount of charge the dielectric is capable of holding between two conductors is its specific induction capacity. Air is taken for a standard.

The capacity of a condenser is increased as the thickness of the dielectric is diminished or as the area of the conductors or plates is increased.

The capacity of a condenser can be varied by using different dielectrics, all other conditions remaining the same, thus with air, which has a specific inductive capacity of 1.00, used as the dielectric, we find a condenser has a capacity of 1 micro farad. By using paraffine as a dielectric in the same condenser, its capacity will be nearly doubled owing to the fact that paraffine has a specific inductive capacity of 1.99.

The unit of capacity is the farad. A condenser holding a charge of one coulomb with a difference of one volt potential between the plates would have a capacity of one farad. Such a condenser would be very large, and in order that the term may be used relatively to the size of the condensers, it is divided into a million parts, and the term micro-farado or M. F. is used.

The conducing plates in condensers are usually spoken of as tin-foil, although upon investigation the writer has been reliably informed that the so-called tin-foil used by two of the largest electrical firms in manufacturing their condensers is composed of 80 per cent lead, the balance being tin.

The dielectric used in most condensers is white tracing paper about one ten-thousandths of an inch in thickness. As it is almost impossible to procure paper devoid of so-called pin holes, two layers are used between each sheet of foil.

A rolled condenser, so-called from the process used in constructing it, of 1 M. F. capacity, is made somewhat as follows, allowing 1,820 square inches of foil in each conducting strip: Strips are cut, seven inches in width, which would necessitate their being 22 2-3 feet long in order that they might have sufficient area. Four strips of tracing paper, cut seven and one-half inches wide, in order that they may project a quarter inch over each side of the foil strips for protection, is next prepared. The paper strips are about a foot longer than the conducting foils. Each strip of foil has several turns taken about a thin strip of brass or German silver 1½x8 inches long for a terminal. Each foil strip is then placed between two paper strips as they are wound up on an oval of such size that the condenser will be the size and shape desired after it is pressed. After the strips are wound they are taken from the oval form and placed in a vat of paraffine heated to 280° F. After all bubbles have ceased to rise the condenser is taken from the vat and placed in a press where it is formed. The presses used for this purpose are kept warm in order that the paraffine the condenser has absorbed during boiling will not become cooled. After the condenser has been pressed sufficiently it is allowed to cool before it is taken from the press. It is then wrapped in heavy paper, preparatory to being placed into its containing case.

The ordinary condenser used in connection with telephone work has a case of tin which is usually filled with inlaid paraffine for protection after the condenser is in place.

The condenser terminals are fastened in a manner best suited for the purpose the condenser is to serve.

In the standard condensers used in connection with galvanometers for testing, it is preferable to have the different terminals arranged in such manner that the parts may be plugged in series, or parallel or separate. The plug terminals are usually arranged in ratios of ten.

By placing condensers in parallel the capacity of each is added to determine their joint capacity; thus the joint capacity of two condensers having a capacity of two and four micro farads respectively is six micro farads, or the sum of both their capacities.

The joint capacity of condensers placed in series is equal

to the reciprocal of the sum of the reciprocals of the condensers.

To determine the joint capacity of the same condensers placed in series proceed as follows: The reciprocal of 2 is ½; the reciprocal of 4 is ¼; and the sum of these reciprocals is ¾.

The reciprocal of the sum is 4/3 or 1.33 micro farads—their joint capacity.

A condenser having a capacity of 1 M. F. has a resistance ranging from 1,000 to 2,500 megohms according to the material used in its construction.

A condenser placed on a circuit carrying alternating current absorbs a part of this current as the E. M. F. at its terminals increases and discharges as the E. M. F. at its terminals decreases. In the first half cycle the condenser discharge increases in its negative value as the line of E. M. F. decreases in its positive value, and as the positive line of E. M. F. decrease to zero the negative condenser current attains its highest value. At the time the positive line E. M. F. attains its highest value the negative condenser current decrease to zero. In the next half cycle the condenser current increases to its highest positive value and decreases to zero while the line E. M. F. passes from the negative highest to a highest positive value.

By reason of the above facts the condenser current reaches its zero value while decreasing ninety degrees in advance of the same line E. M. F. value and its highest negative value ninety degrees in advance of the highest negative value of the line E. M. F.

The condenser is one of the principal factors used in making the operations of central energy systems successful. The larger share of central energy telephones have condensers applied in their circuits in such manner that they are in series with the ringer coils across the line. Lines having telephones of this description placed on them, are held open to the constant line current, as constant or slowly pulsating currents cannot flow through condensers. But to alternating or rapidly pulsating currents, condensers present an easy path; therefore it is possible to bridge the telephone ringer coils in series with a condenser across the line without actuating the flow of the line battery and still be able to summon such telephones.

There are telephone circuits in which the condensers serve another purpose in connection with the one described above. In such circuits the condenser is placed in connection with the induction coil in such manner that at the time the transmitter resistance is fixed, it absorbs a charge, which it discharges at the time the transmitter resistance decreases. This discharge tends to aid the actual line current, so it can be seen that the condenser acts as a reservoir, so to speak, which evens the current supply to the transmitter during its action.

The condenser is also applied in composite telephony circuits owing to its adaptability in checking the telegraphic currents and at the same time presenting a path to telephonic or talking currents.

In making capacity tests, condensers are used to determine a constant before applying the testing apparatus to the wire to be tested.

The capacity of telephone cables should be as small as possible, as it greatly retards and distorts the talking currents. This has been proven decidedly by the unsuccessful attempts in telephony, using the conductors of submarine cables. The capacity of such cables is very high, about .33 micro farads per mile for each conductor.

A few years ago Prof. Pupin experimented extensively to overcome this capacity by inserting small choke coils at certain intervals in each conductor. These coils presented self-induction which lags ninety degrees back of the actual line of E. M. F. and as the E. M. F. due to capacity has been shown to be ninety degrees in advance of the actual line E. M. F., it can be seen that by the proper proportioning of the two forces, both would be neutralized, but this has only been accomplished experimentally.

A THREE MILLION DOLLAR COMPANY.

The Pioneer Telephone Company has opened its general offices in Oklahoma City for Oklahoma and Indian Territory. This is the largest telephone company in the Southwest and one of the largest in the country.

The Pioneer Telephone Company recently amended its charter and the capital stock of the new company as made by its amended charter is now $3,000,000. It is officered by Oklahoma people and its president is John W. Noble of Oklahoma City, who is at the head of the local Independent exchange and who has in the past three years developed into one of the most successful telephone men in the country. Mr. Noble a few years ago established a small exchange with a few miles of toll line in Perry and Noble county. The lines were gradually extended until Guthrie was reached and an Independent exchange was started in that city. The company was unable to make arrangements to get into the metropolis, however, and it seemed as though their progress was to be stayed. At about this time, however, a company was organized to install an Independent plant in Oklahoma City and finally a franchise was secured and the plant was installed. No sooner was it completed than Mr. Noble and his associates bought it and with this plant as a nucleus the growth of the Independent lines in Oklahoma has been the most wonderful in the history of telephone construction in the United States. Thousands of miles of toll lines have been constructed, all being connected with Oklahoma City as the central point of the system. In addition to the toll lines that have been built a number of Independent exchanges in the smaller cities of both territories have been purchased outright by the Pioneer company and a number of new plants have been installed until to-day there is hardly a city in the two territories of any consequence that has not its Independent telephone exchange.

In Oklahoma City the company was compelled to entirely rebuild its exchange owing to faulty construction by the original owners, and it has consequently been unable to undertake the installation of new telephones. It has had hundreds of applications and has now commenced its new work. It has about 800 telephones in operation at this time and by the end of this year expects to have at least 1,500 or possibly 2,000.

THE TELEPHONE THE GREATEST INVENTION OF ALL.

This paper now and what it was thirty years ago is graphically illustrative of the progress made in electrical science and invention.

To my mind, the greatest invention within or without this span is the telephone. The electric light is a priceless boon, the trolley a great utility, wireless telegraphy a wonderful achievement; but the telephone is all these and a blessed benefaction in human affairs as well. Its sublime simplicity and marvelous adaptability transcend all comparisons in the domain of pure or applied science.

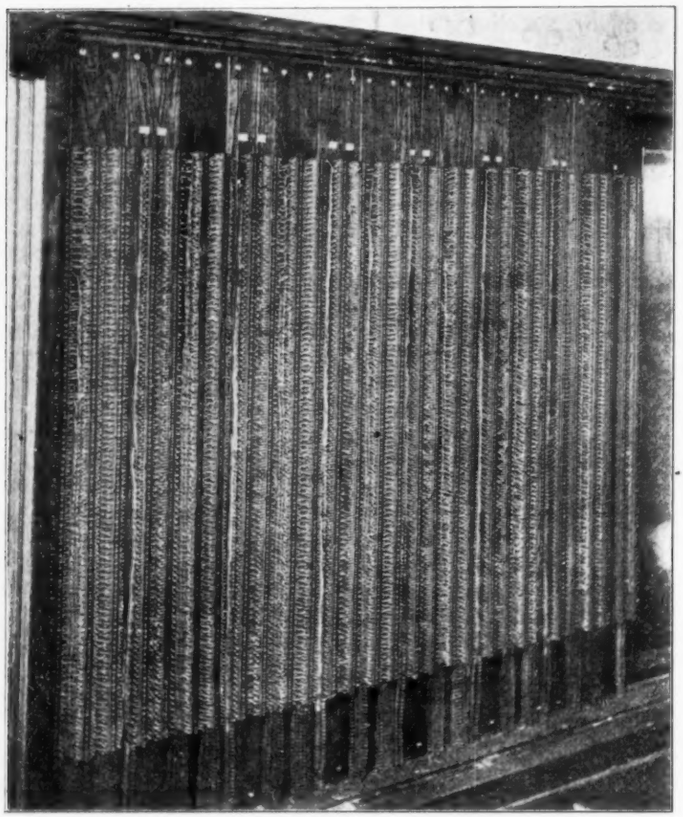
The extension of audible speech transmission from a stone's throw to a thousand miles, and with quieter inflection, is a work unrivaled. The telephone is an allayer of worry, an assuager of sorrow, a life saver, a deterrent of crime, an earnest of security and an indispensable commercial necessity. The world could better afford to go back to the "penny dip" and the stage coach than give up the telephone.

As to what the future holds no man may say; but even though he explores the ambient clouds on a radium motor, with a searchlight for a rudder, the telephone invention will still be secure in its peerless position.—*Electrical World.*

Success of an Eastern Exchange

Prior to 1900 the Independent telephone movement had not secured the impetus in the East that it had in the West. About this time, however, the East was awakened to the importance of Independent telephone systems by the success which they had obtained in the West.

Meadville, Pennsylvania, with a population of 10,000, offered a very promising field, as it was a live and hustling city, and the business men demanded a better and more reliable telephone service. In the early part of 1900 the Meadville Telephone Company was organized and immediate building operations commenced. A subscription list of 350 subscribers was secured, which at that time was considered almost the limit. This was not the case, however, for with an equipment to take care of 350 subscribers ordered, it was found necessary to increase the equipment to take care of 750 subscribers, as the original subscription list had been increased during the building operations from 350 to 550.

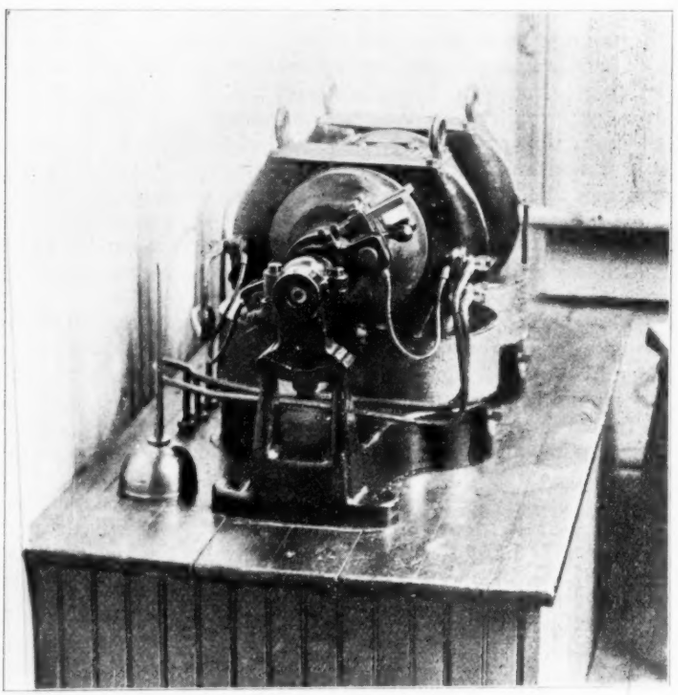


SECTION OF MAIN AND INTERMEDIATE DISTRIBUTING RACK.

The equipment was a magneto system, installed by the Century Telephone Construction Company of Buffalo, and when the company opened its exchange in the latter part of 1900 the people were agreeably surprised at the prompt and efficient service which the new operating company gave. The rates were reasonable, the service prompt and the patrons were accorded the most courteous treatment. This policy so impressed the general public that the subscription list rapidly increased until the company was serving over 1,300; and the magneto switchboard, although it had been enlarged from time to time, was utterly inadequate to take care of the rapid increase and at the same time maintain the efficiency of the service.

In August, 1903, the company contracted with the Century Telephone Construction Co. of Buffalo, N. Y., the original builders of the plant, for a complete common battery system capable of furnishing immediate service to

MAIN SWITCHBOARD, MEADVILLE EXCHANGE.

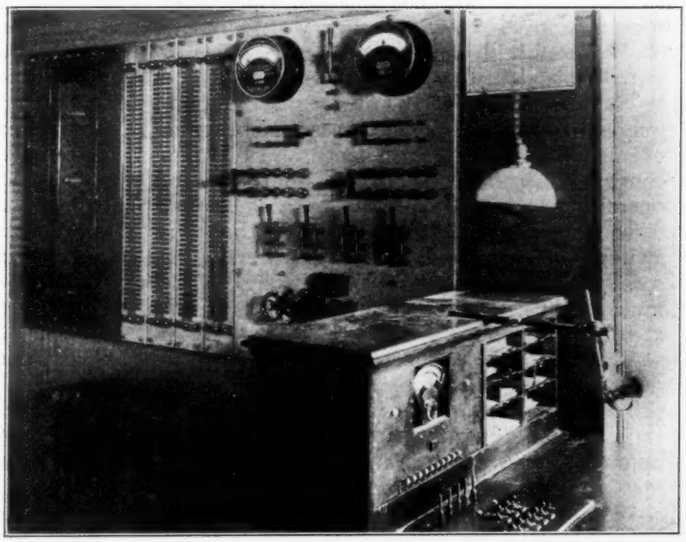


CHARGING MACHINE, MEADVILLE EXCHANGE.

1,600 subscribers. The outside wire and cable plant was enlarged so as to accommdate the increase; about 20,000 feet of fifty and one hundred pair cable being added. The

plant was successfully turned over from the magneto to the common battery system without interference with the service, and the new plant is furnishing service which is more than satisfactory to the public, as is evidenced by the daily applications for telephone connections.

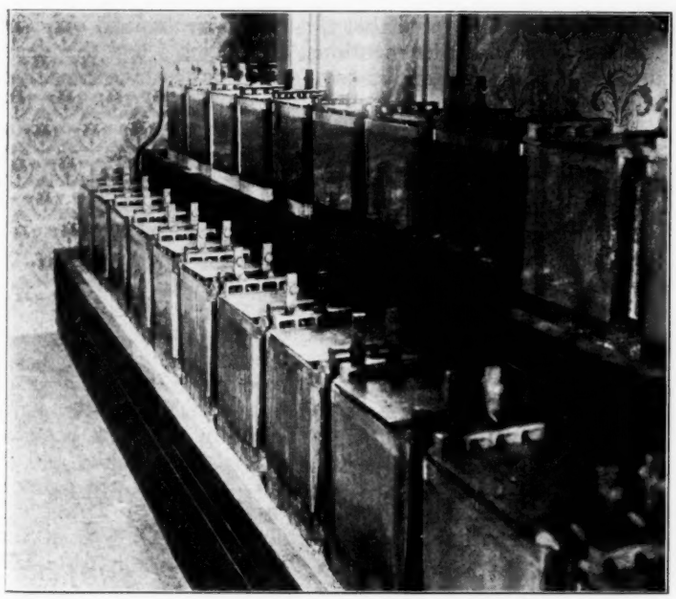
The system installed is the latest type of common battery. The switchboard is of the lamp signal multiple type, the cabinet of which is made of selected quartered oak, piano finish. The design is simple and the proportions harmonious. The ultimate capacity is 3,600 lines, and has eight



POWER AND FUSE BOARD AND WIRE CHIEF'S DESK.

positions equipped; seven positions for handling local lines and one position for toll and rural lines. Every detail for the rapid and accurate operation of the board is complete.

The relay rack is placed immediately back of the switchboard. The combination main and intermediate distributing frame is placed in the terminal room. The outside cables



STORAGE BATTERY PLANT, MEADVILLE EXCHANGE.

end in terminal heads provided with fuses and lightning arresters, which are protected by a well-finished, dust-proof oak box, so arranged that the entire front opens, allowing easy access to the fuses and arresters.

The power plant consists of two sets of twelve cells, each 520 ampere hour Gould storage batteries, which are charged by a 2,000-watt direct-connected Crocker-Wheeler motor-dynamo. The power board is of selected Tennessee pink marble, on which is mounted the volt meters, ammeters, switches, circuit breakers, starting boxes, etc., for the control and regulation of the charging and discharging of the storage batteries. The fuse panels are also mounted on marble to correspond with the power board.

The wire chief's desk is equipped with testing instruments, so arranged that he can at any time make the necessary tests for the location of trouble. The entire central station equipment is complete and up to date in every respect. The executive offices, bookkeepers' room, manager's office, etc., are centrally located and furnished with all modern appliances for the economical, rapid and practical management of the business of the company, while the store room and repair shop are so located as to take care of the supply and material side of the exchange in the most careful and proper manner.

The outside wire and cable plant was built by and the substation instruments and central station equipment are the product of the Century Telephone Construction Co., Buffalo, N. Y.

To all visitors to Meadville interested in telephone ex-

MANAGER'S OFFICE, MEADVILLE EXCHANGE.

changes the Meadville Telephone Company extends a very cordial invitation to inspect its plant.

TEACHING BY TELEPHONE.

According to a Pittsburg telephone manager, the telephone was put to a novel and unusual use in Washington county recently, enabling two boys, sons of farmers, to hold their positions in their classes in the public schools from which they will graduate in another year. Incidentally the patience and long-suffering of the country school teacher was put to an admirable test. Smallpox broke out in the neighborhood in question and the two scholars were among the early victims. The home was quarantined and there was every indication that the instruction which they had been receiving would be cut off for an indefinite period. But the teacher was resourceful and willing. He called up the stricken home one evening and proposed that the boys study their lessons as usual and he would hear them over the telephone. The idea was eagerly received. Each evening they took down the receiver and the teacher, located several farms away, heard them recite. Neither suffered to an appreciable degree through their absence from school, and their chances for graduation are just as bright as before the disease entered their home.

The Automatic and the Critic

ERNEST A. FALLER.

FROM its infancy, the pathway of the automatic has been beset with difficulties; it has been declared dead by seemingly competent authorities times without number; a great amount of valuable paper has been used up, and a still greater amount of mental energy has been expended in proving that it would never, never do; and still it will not down, but, on the contrary, gradually works its way into the larger cities, having long since proved its adaptability for the service of small communities.

It is difficult to understand why men of vast knowledge and undoubted qualification, to give authoritative opinions in this matter, should be so bitter and unjust in their treatment of the automatic idea, and it is therefore a great pleasure to peruse the article of Mr. Dommerque in the March number of TELEPHONY.

While the writer differs with Mr. Dommerque in a good many points raised in the article mentioned, and will endeavor to give his reasons later on, he must say that he has never before read in the technical press a statement coming from a disinterested and competent source which has treated the subject with such freedom from bias and in a spirit of absolute fairness.

I do not know whether the horoscope of the automatic telephone has ever been cast, but if there is such an occult document in existence it must undoubtedly make excellent reading for that class of people whose fancies run to the gloomy and tragic.

Where Mr. Dommerque has reached faulty conclusions, it has been on account of lack of information about the newer developments in the automatic art, and it is with a view of now making this information public rather than to criticise his able paper, that this article is written.

The remote ancestor of all automatic systems—namely, the "Connolly & McTighe system"—has been copied in its essential parts by the great majority of inventors in this field. Quite aside from its being the first automatic, it was also the first multiple system. This was in so far a calamity, as practically every worker in the automatic field has ever since felt in duty bound to embody the multiple feature in his system, and has lost sight of the fact that this multiple, far from being a necessity, is a direct disadvantage, as it militates against a simple, reliable and durable system.

It will not do to say that because the manual multiple system is the highest development of manual exchange practice of to-day it is representative of best automatic practice, for even if the former were the case, the conditions governing automatic working are different. The co-operation of two or more operators in manual working, in putting up a connection, leads to errors, complications and delays from which the multiple board is free, because in it, any one operator can put up any one complete connection originating in her position, without assistance. This is the only advantage the multiple board has, and it is indeed dearly bought.

Co-operation between two or more independent automatic mechanisms to put up a connection is easily attained, and is just as certain as if one mechanism alone performed a variety of functions; this being a fact, what advantage is there in the multiple feature?

The Strowger system which Mr. Dommerque quotes, and which is at present in most general use in this country, is a multiple system pure and simple, when used in small exchanges, but a multiple system having only one answering jack per position, or, in other words, having one operator per subscriber's line, or as many operators (automatic switches) as there are subscribers.

The later and larger Strowger installations are however no longer of the simple multiple type, but rather combinations of multiple and transfer boards. In the putting up of a connection in these installations there are first two trunking operations, and only the last step is a multiple operation. Three distinct and independent mechanisms or automatic switches co-operate to make a connection, and perform this service satisfactorily, and this being so, why should the multiple principle, involving millions of contacts, be used at all?

Mr. Dommerque has devoted considerable space to the description of the manual transfer-board, which seems a little out of place in an article dealing with the commercial aspect of the automatic. He does not entertain a very good opinion of the transfer board, but if he wants to convey the idea that because an automatic system is based on the principle of the express board, it has also its drawbacks, he is just as much mistaken as if he considered an automatic system exceptionally meritorious, because it contained special features of an excellent manual board.

As I have stated before, the necessity for employing more than one operator in putting up a connection in a manual board constitutes a great disadvantage. In an automatic board such is not the case. Furthermore, it is not possible in the nature of the thing, to build a large automatic exchange, in which each connection is handled by one piece of mechanism alone.

It may here be stated that the Faller mechanical operator for 100 lines which he mentions, and which I had the pleasure of showing and explaining to him quite some time ago, is not a transfer board at all, but the equivalent in principle and function of a small manual switchboard of that capacity, such as is now universally used in isolated telephone systems. It has one hundred jacks, and an equipment of ten cord-circuits, by means of which any two jacks can be connected directly. This small automatic exchange deserves mention, because to the best of my knowledge it is the first automatic board ever built, employing cord-circuits. The employment of the cord-circuit principle is the distinguishing feature of the Faller system; its foundation, as it were. Through its use it is made possible to keep the number of contacts required in a large system within modest limits. Just as in manual practice it makes it possible to provide only a sufficient amount of apparatus to handle the peak of the traffic, to use the most perfect talking circuit possible, and to give with an automatic exchange any and all kinds of local service now possible with a manual board.

The little 100 line machine, which Mr. Dommerque saw, has long since become obsolete, still it would be hard to find even to-day an automatic exchange of this capacity, combining within itself the following points of excellence:

Full central energy. Every contact made and broken by power. No relays. Only fifteen magnets. Only 544 contacts all told. Using ordinary commercial instruments.

The Faller system has gone through a steady process of improvement, standardization and perfection, so that to-day it is capable of taking care of any kind of service and suitable for any size of exchange. The various points of Mr.

Dommerque's comparison will now be taken up with reference to this system, and it will be shown where his statements need modification or correction.

The relative merits of common versus local battery need not be considered here, since an automatic system requiring local batteries cannot be considered on a par with a common battery system. If the Strowger interests advocate local battery transmission, the reason is perfectly obvious.

The censure which Mr. Dommerque metes out to *all* inventors of automatic apparatus in regard to their utter neglect of that pet of the designer, a perfect talking circuit, hits me a little hard. It comes as an unexpected bolt from a clear sky, for I have been heretofore and for that matter, am still, a little proud of my achievements in that line.

The talking circuit of the machine which he saw contained only one contact at each subscriber's instrument and five at the exchange, besides two impedance coils, a clearing-out magnet with a parallel shunt to it, and the battery. I must say that during a telephone experience covering many years, I have never yet seen a central energy talking circuit contain a lesser number of disagreeable features.

The present talking circuit of the Faller system contains besides one contact in each instrument, eight contacts in the exchange and two clearing-out magnets. To the best of my knowledge or belief, the designers of manual boards have not yet been able to do any better in this respect. Furthermore, all the contacts at the automatic exchange are knife-blade contacts positively made and broken by power, and of an area and pressure many times in excess of those employed in a jack, whose contact with a round plug is theoretically only a line, and at all events is very small. The total absence of the multiple principle gives me a circuit which is at all times perfectly balanced.

The fact that in an automatic system the subscriber has to do more or less of the operating, and its resultant disadvantages having been lovingly dwelt upon by practically every writer on this subject in the technical press, it was no surprise for me to find a reference thereto in this article. The general spirit of fairness, however, so sadly lacking in other writers is pleasantly in evidence here.

The best automatic system is of doubtful utility if the calling apparatus is too complex or difficult to handle. A great many excellent devices of this character are utter failures, because human nature or the mechanical ability of the user was not taken into consideration in their design. A successful calling device for an automatic telephone system must, before anything, be "fool-proof," must be so simple that a child can use it, to quote a time worn phrase, and must as far as possible preclude errors.

The Faller sender, or transmitter, is designed on these lines. The act of setting the device preparatory to transmission is made entirely independent of its actuation by the exchange; in other words the subscriber is through with what he has to do to get a connection *before* the exchange even starts to take it up. He can set the number he wants quickly or slowly, as his skill and dexterity permits. If he makes a mistake, he has time to correct it before actually turning in the call. His act of turning in the call on completion of the setting is a distinct, though simple, operation. After the call goes in he has a record of it on the face of the sender, and should a line be busy, he may again call the number by a simple turn of a knob.

The contention that the use of a more or less complicated sending instrument in an automatic system constitutes a serious defect, since a failure of the sender to operate would cut off the subscriber entirely from the exchange, has of course more or less foundation in fact, and has been taken into consideration in my design. While I believe that my sender will give little or no trouble, I provide a means whereby the subscriber can still communicate with the exchange if it should become disabled. An emergency button on the sender puts both lines to ground directly, which causes the exchange to connect that particular subscriber to the trouble-department. This is done over a circuit of which the sender proper is not a part, so that its condition cannot affect it.

In my system, any ordinary commercial instrument of the central energy type can be used without any modification whatever. The sender has no mechanical connection of any kind with it, but is simply connected to the line, in parallel with the instrument. A base of peculiar construction is provided, to which the sender is fastened by a simple lock. When the sender is taken from its base, all line connections are automatically broken between it and the base. To remove a disabled sender it is therefore not necessary to disturb the line connection at all. The sender is compact, being but four by four inches in size, so that one or more can be carried without inconvenience by the outside trouble-man. Should a sender become disabled he can immediately replace it and take the disabled one to the shop for repairs. It is therefore not necessary to employ specially skilled labor on outside trouble, which of course *is* essential in an automatic system requiring a special subscriber's instrument.

Mr. Dommerque next speaks of the great simplicity of the subscriber's instrument of to-day, and of its simple handling. Has he forgotten that we owe the automatic signal (the call by the switchhook) to the inventors of the much maligned express board? The high degree of standardization and centralization of which the manual board has become capable can just as well be applied to the automatic exchange, but in addition, the latter will always have the advantage of absolutely uniform operation and will not have to contend with "mallets," "wooden arms" and the like. When he says that the apparatus is substantial, I doubt very much whether he is thinking of multiple jacks on 5/16" centers, and when he mentions that the wear and tear is reduced to a minimum, he cannot possibly have the cords in mind.

My exchange apparatus *is* substantial; in fact, is a machine. It does not need any delicate parts, because crowding is unnecessary. All moving parts operate at a moderate speed and all contacts are of ample surface. No motor magnets are used. The signal receiving apparatus is entirely separated from the switching apparatus, which has enabled me to give to both a construction best adapted for their intended purpose. The signaling impulses have no work to do beyond the movement of a light, unloaded armature.

It was at one time true that "when an automatic switchboard got sick, there was trouble." I have not slighted the importance of uninterrupted service, and while the chances of my swithchboard getting "sick" are remote, I have provided for this emergency. Should anything happen to one of my boards, there will be no "trouble," as means are provided to transfer the service instantly to a "healthy" board without a moment's interruption. Space forbids entering into this matter in detail.

The ground connection for signaling, is a necessary evil of all practical automatic systems, but I believe that the figures which he gives for installation and maintenance are excessive. As to the relative cost of installation of a modern multiple system and a Faller system, a few figures will enable the reader to draw his own conclusion. The Faller apparatus, outside of the subscriber's instrument, costs $20. A good instrument can be bought in the open market for about $8, making the total cost $28.

One switchboard trouble-man for each 2,000 lines is ample, and his salary may be put at $75 per month. A Faller one hundred line unit occupies a floor space of six square feet, so that it is safe to figure on a floor space of about fifteen feet per hundred lines. This will give ample room for working space all around *each* unit and will even make it possible to remove an entire unit in its assembled state from the middle of a filled operating room. Manual multiple boards of considerable size take as a rule from 75 to 100 square feet floor space per 100 lines or about five to six times as much as this automatic system.

While it is true that there is as yet no good way to provide automatic toll service, still I believe that the assumption of Mr. Dommerque that an automatic exchange represents the same item of expense in regard to accommodation for the operators, lighting and heating, is incorrect, because in an exchange such as he quotes, there would be at any rate sixty persons less to be accommodated. This, in itself, would make quite a difference. Nor do I quite agree with his conclusion: "In any case the saving in operators' salaries is offset by the increased expenditure for other items." This statement has been made time and again by writers upon the automatic subject, but it is surprising to me that a man who evidently attempts to treat the subject with fairness as Mr. Dommerque does, should fall into the error of making such an assertion, without having a proper foundation in fact therefor.

Granted that there is an automatic system not appreciably more expensive to install in the first place, and just as easily and cheaply kept in repair as a multiple board, how can the automatic system be as expensive as the manual; or in other words, where does the money go in the automatic which in the manual is spent in operators' salaries and which, according to Mr. Dommerque's own figures amounts to one-half of the total expenditures, including interest, depreciation, etc.?

The time has passed when the manual board had a decided advantage over the automatic system in that it could give selective party line service. While I believe that with a more general introduction of automatic working and its consequent cheapening of the service to the subscriber the party-line will be gradually weeded out, I have not closed my eyes to the fact that at present it is necessary for a telephone company to give different kinds of service and that the party-line is under certain circumstances a greater producer of revenue than a direct line.

There is provision made therefore in the Faller system, to give four-party-selective ringing service. Whatever Mr. Dommerque says in regard to the perfection of this service in manual boards, refers also to the Faller system which employs a talking circuit in all respects identical with that being the best practice of the day. No special instrument is required in this automatic party-line service and any of the manual party-line systems, so far brought out, which have at all come into commercial use are adapted to it, those employing biased ringers as well as those employing variation in frequency. My automatic system has even a decided advantage over the multiple board in party-line working, insofar as the party-line ringing mechanism need only be provided in sections handling party-lines, leaving the balance in the installation entirely unaffected. The service could even be made "locking," but of course there will be no necessity of going to this complication since what Mr. Dommerque says about this feature applies to the Faller automatic system as well as to any manual party-line system.

My system is not intended at present for rural systems, and I do not believe that any automatic system can ever be designed capable of handling both city and rural service indiscriminately. It is possible, however, with my apparatus, to so connect a number of exchanges located perhaps in neighboring towns, so as to unite them to all intents and purposes into a system of considerable size.

As I have stated, this system is capable of giving whatever local service can be given now in a manual board. In the case of the pay-station, there is even less complication required at the instrument than in a manual system. This is due to the fact that the transmission of the number wanted is effected without the use of the receiver or hook switch, which consequently may be used for the pay-station feature.

It is also possible to combine the pay-station with the automatic sender, and in this case graded rates can be collected dependent upon the number of the subscriber wanted. If the user of the pay-station fails to deposit the proper coin corresponding with the rate to the point where the wanted subscriber is located, he will not get the connection.

The matter of busy lines is well taken care of, and in the case of a busy line being called from a pay-station the station returns the money.

It is true in a sense that a manual multiple switchboard has reached its highest degree of perfection. It may even be said that the multiple board of to-day represents the last step in the progressive art of construction, as far as that particular type of board is concerned. But evidently it cannot be said that the multiple board is flexible or adapts itself readily to conditions. We would come nearer the truth if we say that each particular city requires a special multiple board adapted to its conditions. But we must not lose sight of the fact that the multiple board is also at best, an *expedient* from the electrical standpoint, and I do not believe that any authority on telephone matters would be willing to go on record as saying that the multiple feature was an advantage, or even desirable, instead of a necessary evil.

My system is strictly a unit system and an exchange represents simply an aggregation of sections of 100 lines each, all alike. Since the construction and equipment of these units does not vary with the capacity of the exchange, additions can at any time be made without in the least disturbing the existing installation. As I employ no multiples, it is not necessary to locate all the apparatus in one building, and the service does not suffer in the least if the system is subdivided.

All trunk lines between exchanges require only two wires. No extra order-wires, or connections of any kind beyond a sufficient number of trunks to handle the peak of the day's traffic are needed.

"We have many cases on record, in which a switchboard has been given the benefit of a new invention at comparatively little cost." This quotation from Mr. Dommerque's paper and also the matter following, is for certain reasons just now of great interest and will be dwelt upon at some length. I understand that in a discussion of his paper in Chicago, a gentleman from Cleveland gave some views in regard to the probable trend of development in manual boards which I share, namely, that wherever conditions require the retention of manual apparatus, this apparatus should be rendered entirely automatic as to selection, and leave only the mechanical work of plugging to the operator.

My semi-automatic system does exactly this. In it, the jacks, plugs, etc., and the general scheme of circuits of the manual board are retained. It is perfectly feasible and a matter of comparatively slight expense to remodel any existing manual board as long as it is a metallic circuit board, into a semi-automatic board.

Like my entirely automatic, my semi-automatic system requires no multiples and is strictly a unit system capable of any subdivision desired. The service and method of operation is identically the same whether a call goes through one or two exchanges, and the speed of connection is far in excess of the best multiple boards to-day. All operations requiring mental effort or skill on the part of the operator are eliminated, her work is reduced to the inserting of plugs into jacks, whose exact location is indicated in every case by lamp signals, and the handling of two keys.

Whoever holds the opinion that the trend of improvement in the exchange is in the line of simplifying the operation of a manual board, and rendering it as far automatic as it can ever be rendered, certainly should be interested in my semi-automatic exchange. It is hardly probable that the idea of automatic signaling and selection will, or can ever be carried beyond the point reached in this system.

The operator may be deaf and dumb, it does not matter a particle, and the subscriber will never know it. As long as she has eyes to see, and the free use of her arm and hand, it is immaterial whether she ever learned her "three Rs." She

need not be familiar with the language of the subscribers, never having occasion to enter into conversation with them. No talking or listening equipment being provided for the operators, the system is of course entirely secret. Furthermore, she is never called upon to pick out a particular jack from many thousands in a fraction of a second—the constant task of the multiple operator. Automatic devices do the selecting for her, even to the indication of the exact spot where she should insert a plug. It is hard to conceive a system retaining the human operator, being rendered still more automatic.

Notwithstanding Mr. Dommerque's statement, I consider it hardly necessary to journey to China or Turkey and start afresh. Would it not be better to begin right in this country and enhance the value of several hundred million dollars' worth of obsolete switchboards with a comparatively small outlay?

As a matter of fact, this semi-automatic system was designed for just that purpose and its field of usefulness in this country alone will be enormous.

Returning now to my entirely automatic system it will be seen that the step from the manual to the automatic is not so great as Mr. Dommerque would have it, because, firstly, the subscriber's instrument does not have to be discarded nor even altered. Secondly, no alteration in the line plant, terminals, protectors and power-plant has to be made beyond the providing of a ground connection at each instrument.

There are many switchboards discarded annually in this country, so there is no reason why there should not be an opportunity for a good automatic system to step in and take the place of such discarded apparatus, especially if part of the old equipment could be utilized.

We must not forget, however, that a change or remodeling of a telephone system which necessitates a temporary interruption of the service is a serious step, and the difficulty assumes greater proportions the longer this interruption continues.

Neither is it always expedient nor even practicable, to make the change all at once, because, as Mr. Dommerque states, the apparatus of a telephone exchange in most cases is in different stages of preservation or serviceability.

The ideal automatic system must therefore be capable of introduction *without* interrupting the service and must also co-operate with the manual board interchangeably, both temporarily and in some instances for protracted periods or permanently. To change an entire system, even of considerable size, from the manual to the automatic no longer presents any difficulties, as the recent inauguration of the Strowger system in a Michigan city shows. The feat there performed probably made a new record; 5,000 lines having been cut over, as is reported, in five minutes.

A partial change to automatic, however, is a more difficult thing. Most of the older automatic systems employ a special, and more or less complicated talking circuit which cannot be used with the circuit of the manual board. Then again, clearing out is effected in a different manner. I believe that my system is the only one in existence which can readily and without complication co-operate with manual boards, because its talking circuit and also its method of clearing out are *identical* with those of the manual. It does not matter whether a call originates in the manual board and terminates in the automatic or vice versa. Both systems depend upon the opening of the line circuit to give the clearing out signal. In the case of the manual, the supervisory relay causes a lamp to go up causing the operator to take down the connection, and in the automatic it directly actuates the disconnect mechanism.

The only disadvantage resulting from the use of a mixed system is that means must be provided in the manual sections to enable the operator to transmit numbers to the automatic sections and also indicators for receiving signals from the same.

In cases of this character the logical solution of the problem is given in my semi-automatic system, which forms an ideal combination with the entirely automatic. The operation of both is in all respects identical, as far as the subscriber is concerned. It also makes it possible to make a gradual and imperceptible change from the manual to the automatic exchange with a minimum of trouble and expense.

I believe this exhausts the various points raised by Mr. Dommerque, and I repeat that it has been a source of great pleasure for me to peruse his article, because the contrast between his statements and conclusions, based upon knowledge and fact and the wild ramblings of some so-called experts, upon whom the very mention of automatic seems to produce an effect similar to that of a red parasol on a mad bull, is refreshing.

There is no doubt in my mind that the automatic exchange will in the end supersede the manual board *entirely*. This automatic exchange must fulfill certain requirements, however, principal amongst which are speed, reliability and flexibility.

Central energy, and, at least for the present, party-lines are a *sine qua non*. It is safe to assume that all automatic systems based upon the venerable Connolly & McTighe principle, with its multiple and with practically one operator for each line, must soon be sadly out of the race, and will gradually vanish as the automatic system of the future comes to be recognized and takes its destined place.

I do not claim that my system will fill this place or that it is the best for all conditions, but it is my opinion that more of the essential points of an ideal system are combined in it, than in any other that I have ever investigated.

In exactly what manner the evolution of the telephone exchange will take place it is hard to say, but it seems probable that it will take the course to which Mr. Dommerque refers in the closing paragraph of his able paper.

The manual board of to-day will be superseded by the manual board of to-morrow having none of the complications which are its share now, and in these complications I include the multiple. But why should evolution stop there? I for one believe that this perfect manual board will in time be superseded by the entirely automatic board, and then at last, the telephone paradox (increased expense per line with increased capacity) will be a thing of the past.

The question is often asked: "Why is the automatic exchange so slow in coming if there is such a wide field of usefulness for it?" A variety of causes have so far militated against it. Some inventors may have done the cause of the automatic serious harm through their lack of understanding of the prime requirements of a telephone exchange. Others may have wasted their time and failed, because they lacked either the mechanical ability or the electrical knowledge. At any rate, I come back to my original statement that the production of the Connolly & McTighe board was insofar a calamity as to turn the trend of investigation into wrong channels and thereby delay the advance of the automatic exchange for many years. But it may be responsible for more than this; in all probability it engendered the manual multiple board because there is not any record to be found previous to it of a multiple switchboard.

The peculiar attitude of practically all writers on telephone subjects in the technical press has also constituted a serious obstacle in the path of the automatic. These writers have almost been unanimous in their condemnation of the automatic principle, and the subterfuges resorted to, to make points against it, are often decidedly humorous.

It is plain, therefore, that the natural friend of all progress, the press, has not done its full duty towards the "girlless" telephone, but better days seem to be in store for it, when men enter into the discussion of this great branch of the telephonic art in the same fair and unbiased manner as Mr. Dommerque has done.

Cable Testing Faults

F. C. GREENWALD

HOWEVER difficult the duties, one of the most dreaded troubles the wire chief has to handle is that of faults in cables. The reasons for this are that grounds and shorts in cables cannot be cured nearly as readily as the majority of cases of trouble. Wire chiefs, as a rule, have not the means of locating the trouble, and those few who have the necessary instruments, do not sufficiently understand their use to undertake the location of the trouble. Considerable delay is experienced in having cable tester and cableman come to the exchange in trouble.

If those in charge of the exchange were able to locate the trouble, in cases where cable sheating cannot be seen to be injured or defective, much delay might be eliminated. Most any lineman can remove sheathing, boil out cable or repair the wires, clear the trouble and leave the cable ready for the lead-worker to come later to repair the sheathing.

Most exchanges, especially those employing central energy, are now equipped with instruments to locate trouble; but as locating cable trouble, at best, is a difficult, tedious operation, requiring experience with instruments and accuracy, most of us are not able to locate the trouble in our cables. Perhaps had we more instruction in regard to this subject given in the few telephone publications available, we might be able to help ourselves in this respect. Those who have become familiar with this achievement, naturally feel too proud of their knowledge and are perhaps too loth to explain methods in use to their less fortunate brothers, especially to those anxious to receive information and who have hunted in vain, or perhaps have seen only a meager description of the principle, but scarcely anything concerning the application, of the Varley loop test—much less of other methods.

Having the foregoing conditions in mind, the following descriptions of tests are given in the hope the reader will not have the difficulty experienced by others in becoming familiar with at least one good reliable cable-fault test; thus allowing him to locate and possibly clear his own cable trouble and that with men and means available at his own exchange.

Methods are given only for the location of grounds or crossed wires. The location of open conductors is considered entirely too difficult, requiring instruments too complicated to be practiced by anyone, but a man having long experience in such matters and having considerable understanding of electrical testing instruments in general.

In order to use the Varley loop test, the prospective locater must be familiar with some form of Wheatstone bridge, at least sufficiently so to be able to measure resistance. He must also have available one good pair of wires appearing in the head in which the defective wire is known to terminate. If no clean wires are to be obtained inside the cable, a pair will have to be obtained outside the cable and brought to the head. The length of the cable in feet should, if not already known, be obtained by measuring with the tape line.

In description of this test it will be taken for granted that the operator is in possession of a Queen Acme test set, and operation will be described accordingly. If some other form of Wheatstone bridge is used, user can arrange the connections to suit.

The first thing to be done is to have linemen go to the cable head and tie the end of a good pair together, connecting the tie to the wire in trouble, which previously is disconnected from subscriber's line or all other lines, as per Fig. 1.

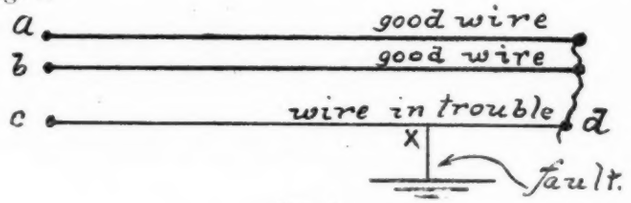


FIG. 1.

After this has been determined to be properly accomplished proceed as follows: Measure the resistance from *A* to B. One-half of the resistance from A to B is the resistance from B to D. This latter resistance should be written down, as it will be needed later on. Next measure resistance from B to C, making the notation. Subtract resistance from B to D from the resistance from B to C, thus obtaining resistance from C to D. This last resistance should also be recorded.

We are now ready to connect the bridge to the wires to take the balance readily, as it is usually termed, so as to obtain the resistance of the bad wire from C to X, the point where the wire is grounded or crossed with another wire. The good wire should be placed on the top line post of the bridge; the bad wire on the lower post, and the commutator plugs should be arranged, as illustrated in Fig. 2.

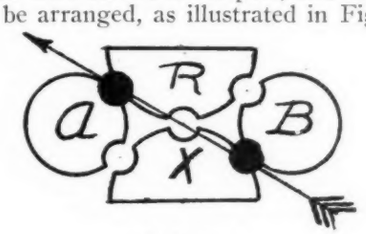


FIG. 2.

Remove 100 ohms from A arms; 10 from B arms; remove the battery cap, from negative battery post and attach wire to this post, running same either to ground or to the wire with which the bad wire is known to be crossed. See Fig. 3.

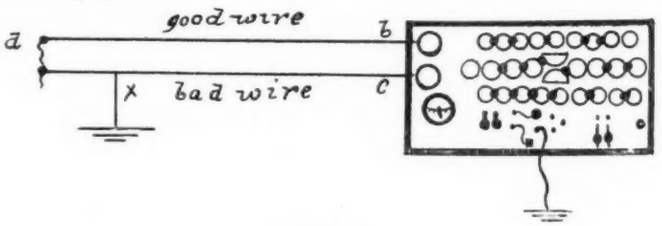


FIG. 3.

This arrangement will give the circuit shown in Fig. 4.

Calling A the resistance in A arm, B the resistance in B arm; R the resistance in variable resistance arm and L the resistance from B to C; and X the resistance from C to X, we have the following proportion, when resistance in variable resistance arm is such as to produce no deflection of the galvanometer needle when battery and then galvanometer keys are depressed: $A : B :: R+X : L-X$, $AL-AX = BR+BX$, $AX+BX = AL-BR$, $X = \frac{AL-BR}{A+B}$

The resistance on bad wire from instrument to the trouble is evident and from the formula can be found as follows: Multiply resistance in A arm (100 ohms) by resistance from B to C; multiply resistance in B arm (10 ohms) by resistance unplugged, in variable resistance arm in bring-

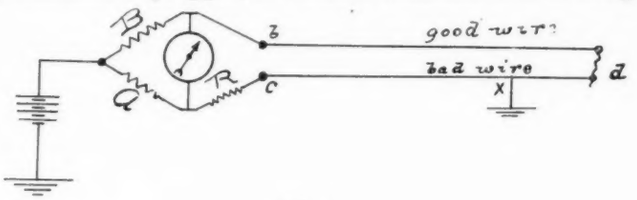


FIG. 4.

ing needle to balance. Subtract the one result from the other, after which divide the remainder by the sum of resistance in A and B arms (100 ohms + 10 ohms = 110 ohms). Final result gives resistance, in ohms, of the bad wire to point of trouble.

We have already determined the resistance from C to D, and now know the resistance from C to X. The distance in feet from office to the trouble may be found thus: Resistance from C to X, divided by the resistance from C to D, multiplied by the length in feet to cable head equals the distance to trouble.

Total distance in feet to head, minus the distance from office to trouble, gives the distance from cable head back to the trouble.

To better illustrate the operation, let us take an example. Suppose distance to cable head is 2,000 feet and resistance from A to B is 50.6 ohms. Therefore, resistance from B to D is 25.3 ohms (½ of 50.6 ohms); resistance from B to C is 70.4 ohms, resulting in resistance from C to D is 45.1 ohms (70.4 — 25.3 ohms).

We find it necessary to unplug 351 ohms to allow galvanometer needle of no deflection. We work out formula thus: 3,630 divided by 110 = 33 ohms.

The resistance of bad wire from office to trouble is 33 ohms. The distance in feet from office to trouble is: 33 divided by 45.1 × 2,000 feet = 1,463.4 feet, or the distance back from head is: 2,000 — 1,463½ = 536½ feet.

After obtaining distance back from head toward office, $X = \frac{100\,(70.4) - 10\,(351)}{100 + 10}$ 7,040 — 3,150 = 3,630, or

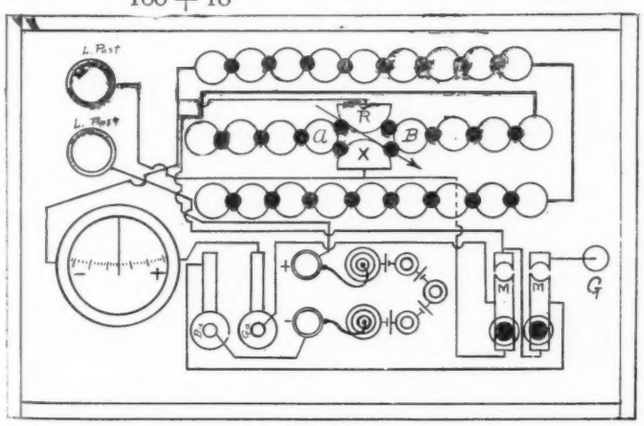


FIG. 5.

we would look for bad joint in that locality. If none is found it might be well to make a test cut at distance obtained, ascertaining in which direction from test cut the trouble lies. By cutting six feet in either one or the other direction trouble should be located if our test in all matters had been accurately made.

Greater accuracy may be obtained by using more battery than is usually placed in the bridge box, say fifteen cells dry battery. To do this disconnect both battery caps on positive and negative battery posts of bridge, attach one side of test battery to positive binding post to which cord of battery cap is also attached, and ground the other side of test battery; or perhaps better allow positive battery cap to remain on positive battery post, attach positive wire of extra battery to negative battery post and ground negative wire of extra source of current. You will by using greater strength of battery obtain larger deflections of the galvanometer needle.

One might also use different resistance in the ratio arms A and B; say 10 in A arm, 1,000 in B arm, and reverse the commutator plugs. The formula for solving resistance of wire, from office to fault, would then become $\frac{B\,L - A\,R}{A + B}$ or $\frac{1{,}000\,L - 10\,R}{1010}$ Should resistance in A arm be made equal to resistance in B arm, formula would become $\frac{A\,L - B\,R}{A\,B} = \frac{L - R}{2}$ Care should be taken in wrapping ground wire around negative battery post to make the connection as tight as possible, using many turns.

In order to apply the Murray loop test, it is necessary to have a Wheatstone bridge adapted for this use. Fig. 5 is a sketch of a Queen Acme test set equipped for this test. All bridges of this make in use by the United Telephone and Telegraph Company are similarly arranged.

Change of arrangement of the bridge is accomplished by altering the position of the plugs at extreme lower left-hand corner. When plugs are in hole marked M, the bridge stands arranged for Murray balance. When in lower hole, bridge stands arranged for Varley loop test or for the measuring of resistance. In using bridge for Murray test commutator should be set as shown in Fig. 6.

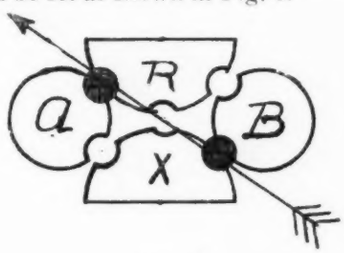


FIG. 6.

Remove 1,000 ohms from B arm, allowing A arm to be entirely plugged up. Run a wire from post marked G to ground or the cable sheathing, if cable sheathing is not grounded.

The following described test is applicable only in case we have one of a pair of conductors in trouble. We must have one good wire and one bad one, and if both these wires are not exactly the same length, consequently of same resistance, test will not be accurate. Frequently, however, we may have mate of the pair grounded and line wire perfectly clear. To proceed: Send a man to cable head to put a short on the pair of wires, as shown in Fig. 7.

Place the good wire on top line post of bridge; the bad wire on lower post. The arrangement will give this circuit, shown in Fig. 8.

When needle of galvanometer gives no deflection after removal of proper plugs in resistance arm, we will have this proportion to work out formula: B : R :: ax : bx, B (bx) = R (ax), L = total length of wire = 2 length of wire in cable, ax = L — bx, 1,000 bx = R (L — bx), $bx = \frac{RL}{1{,}000 + R}$.

Formula indicates the distance to trouble and may be found thus: Multiply resistance unplugged in resistance arm, in order to bring galvanometer to balance, by twice the length of cable in feet. Divide the result of the sum of 1,000 and the unplugged resistance.

An example: Suppose the distance to cable head is 2,000 feet. After making the proper connections we find the re-

sistance necessary, unplugged in variable resistance arm—to allow galvanometer needle to remain at rest—is, say, 950 ohms. Using formula we would obtain this: Distance to trouble $= \frac{950 \times 2 \times 2{,}000 \text{ feet}}{1{,}000 + 950} = \frac{950 \times 4{,}000}{1{,}950} = 1{,}949$ feet.

The cable conductor would thus appear to be in trouble 1,949 feet from office or fifty-one feet from the head.

The advantage in use of this test is its comparative simplicity. The disadvantage lies in the fact both bad and good wires must be in the cable and exactly the same length—that is, must be wires of the same pair. The test is probably the most simple and rapid test of any, requiring no measuring of resistance and but one balance of the needle, giving less chance for errors to be made.

In case we have no good wires in cable or cannot obtain a clear wire having its opposite wire in trouble, a combination of two Murray balances may be made, obtaining an exceedingly accurate and, compared with the Varley, a simple test. In this case outside wires or a pair of good wires found inside the cable will have to be made use of, making connection with the bad wire as in Fig. 1, similar to arrangement of good and bad wires in the Varley test.

In the first balance, arrange bridge and connect according to Fig. 9.

Use b for the good wire attaching same on top line post of bridge. Use C for bar wire attaching on lower line post. Use the good wire to be attached to by the ground post wire. In second balance arrange bridge and connect according to method shown by Fig. 10.

Using b for good wire, c for bad wire, same as before, but running wire attached to ground post to the cable sheathing or ground, instead of allowing it to be connected to a, we obtain formula thus:

$$\text{1st balance } C\,O : b\,L :: \text{1st reading} : 1{,}000$$
$$\text{2nd balance } C\,M : b\,L + M\,O :: \text{2nd reading} : 1{,}000$$
$$bL = \frac{1{,}000\ C\,O}{\text{1st R}} \text{ and } bL = \frac{1{,}000\ C\,M - M\,O \times \text{2nd R}}{\text{2nd R}}$$
$$\frac{1{,}000\ C\,O}{\text{1st R}} = \frac{1{,}000\ C\,M - (C\,O - C\,M)\,\text{2nd R}}{\text{2nd R}}$$
$$C\,M = C\,O\left(\frac{\text{1st R} \times \text{2nd R} + 1{,}000\ \text{2nd R}}{\text{1st R} \times \text{2nd R} + 1{,}000\ \text{1st R}}\right)$$
$$C\,M = \text{length of cable}\left(\frac{\text{1st R} \times \text{2nd R} + 1{,}000\ \text{2nd R}}{\text{1st R} \times \text{2nd R} + 1{,}000\ \text{1st R}}\right)$$
$$M\,O = \text{length of cable}\left(\frac{1.000\ \text{1st R} - 1{,}000\ \text{2nd R}}{\text{1st R} \times \text{2nd R} + 1{,}000\ \text{1st R}}\right)$$
$$M\,O = L\left(\frac{1{,}000\ \text{1st R} - \text{2nd R}}{\text{1st R} \times \text{2nd R} + 1.000\ \text{1st R}}\right)$$

This formula indicates we may obtain the distance in feet back from the head to the trouble in the following manner: Multiply the distance to cable head by 1,000 times the difference between first and second readings. Multiply first reading by second reading and add 1,000 times first reading. Divide the first result by the second. Final result will be the number of feet from head, back to the trouble.

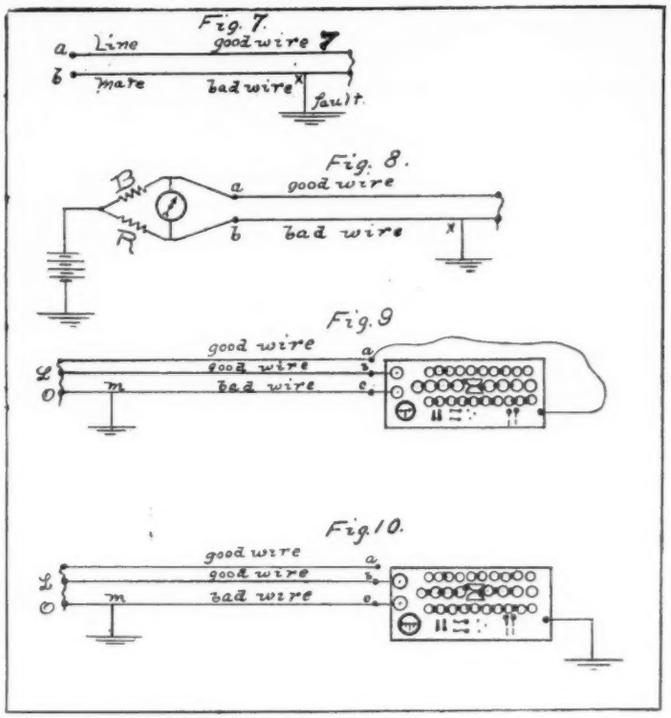
Those familiar with cable testing will, on becoming used to this method, we think, prefer this test above all others.

Suppose on first balance we have found it necessary to unplug 1,001 ohms; on second balance we have found 995 ohms was necessary. Suppose length of our cable is 5,000 feet. Length in feet of the cable from cable head, measured with a tape line, back to point of trouble would be:

$$5{,}000 \times \frac{1000\ (1001 - 995)}{(1001 \times 995) + (1000 \times 1001)} = 15$$

That is, fifteen feet from the head.

The United Telephone & Telegraph Co. has another instrument in use, adapted specially for the Murray loop test. This consists of an oblong box containing twenty small cells of dry battery, a galvanometer and a german silver wire stretched out and divided into 1,000 divisions. One side of the battery terminates in a post marked g, and the other side of battery attaching to a small pointer in a hard rubber handle. This pointer is moved along the slide wire until the galvanometer is brought to point of no deflection, when



battery key and then galvanometer key is opened and closed. Fig. 11 is the circuit showing connections. This instrument is called the "special fault finder."

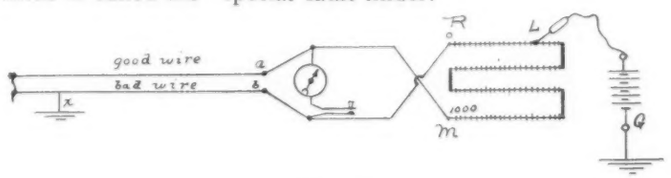


FIG. 11.

In operation of this test good and bad wire, preferably line and mate of the same pair, where accuracy is specially required, are tied together at cable head. The good wire is attached to top line post of instrument and bad wire to lower post. Post marked g is attached to ground or wire to which bad wire is known to be crossed. Starting at zero, at one end of slide wire, pointer is moved along until galvanometer shows a balance upon depression of keys. Figure under pointer is noticed. This figure, indicating the number of divisions passed over from zero to L is termed the "reading."

On balance we have this proportion: RL : LM :: bx : ax, which will work out as follows: RL : LM :: bx : ax,

$$\frac{RL + LM}{LL} = \frac{bx + ax}{bx},\ RL + LM = 1{,}000,\ ax + bx = 2X$$

length of one wire in the cable

$$\frac{1{,}000}{\text{reading}} = \frac{2L}{bx},\ bx = \frac{2L\ (\text{reading})}{1000},$$

Formula indicates the distance from office to point of trouble may be found thus: Multiply twice the length of the cable to head in feet, by the reading obtained; this number to be divided by 1,000. Final result will give number of feet to trouble. For instance, should we find galvanometer will indicate balance when 450 divisions have been passed by pointer and should the cable be 2,000 feet long, we would solve as follows: Distance to trouble $= \frac{450 \times 2 \times 2{,}000}{1{,}000} = 1{,}800$ feet.

With this instrument it is possible to make an extremely simple double Murray balance, similar to method used in connection with specially arranged Queen Acme testing set. A pair of good wires is connected at cable head to the bad wire and two balances made. In first balance, connect ground post to one of the good wires, and in second balance connect ground post to ground. Fig. 12 will give an idea of this test.

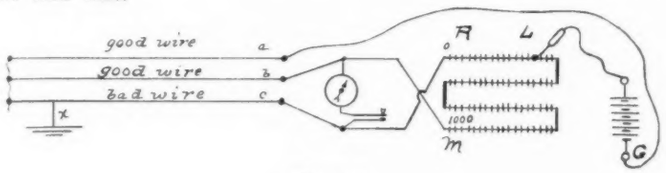


FIG. 12.

Distance from exchange to the trouble would be found by multiplying second reading by the length of the cable, dividing result by the first reading. If reading in first instance was 480, in second instance 475 and cable 2,000 feet in length, our solution would be $\frac{475}{480} \times 2{,}000$ feet, or 1,979 feet.

All the foregoing tests require either some form of commercial Wheatstone bridge or special and rather expensive apparatus. Perhaps some of us would be able to locate

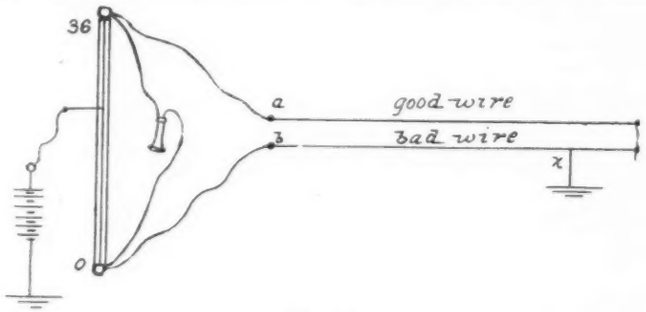


FIG. 13.

cable trouble if we but had some instrument to take the place of the expensive apparatus which may be unavailable. Fig. 13 is a sketch showing simple arrangement of an ordinary yard stick, some cells of dry battery, a piece of german silver resistance wire and an ordinary receiver.

The german silver resistance slide wire may be obtained from a heat coil or some other convenient source. It is to be stretched the entire length of the yard stick. The headphone should be attached to both ends of the german silver wire. One side of the test battery should be grounded and the other terminated in a wire or preferably a knife blade, which is to slide along the resistance wire. As in the other described Murray loop tests, a good and a bad wire, preferably line and mate of the same pair, should be tied together at the cable head. The good wire should be attached to the 36″ end of the slide wire, the bad wire to be attached to 0″ end. After all connections are arranged, tester is to take the kuife blade or the wire attached to one side of testing battery tapping at small intervals on the slide wire. He will notice a point will be reached where the sound of the tapping in the headphone becomes very faint or perhaps cannot be noticed at all. The point where this condition is noticed should be determined as accurately as possible; say it is at the position on yard stick indicating 15½ inches. Suppose our cable is 3,000 feet in length. To find the distance to the trouble it would be necessary to multiply the reading 15½ inches by twice 3,000 feet, the length of the cable, dividing the result by 36 inches, the length of the stick, thus: $\frac{15.5 \times 2 \times 3{,}000}{36} = 2{,}583\ 1/3$ feet from office.

This simply arranged test, providing both good and bad wires are of the same length and test is made as accurately as possible, should give accurate results. Perhaps, however, the following described method would suit most of us on account of its adaptability in case the entire cable was bad. Also we were obliged to use an outside pair of wires, and were very anxious to obtain as accurate a test as possible.

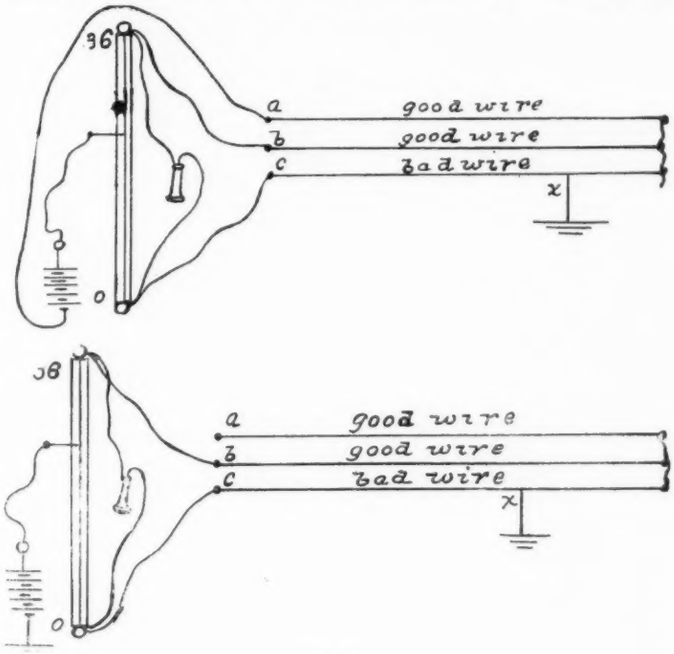


FIG. 14.

As in the other Murray balances using combination of a good pair of wires connected at cable head to the bad wire, we will have to take two balances; first, on one good and the bad wire, using other good wire to connect to with side of test battery opposite to the one used to connect knife blade which is tapped on wire; second, on the one good wire and the bad wire as before, but connecting the side of test battery to the ground instead of to the other good wire. Fig. 14 will probably make this clear.

The distance to trouble may be found by multiplying length of cable by the second reading and dividing result by the first reading. For instance, if the tapping was not heard in first balance when tapping at 14½ inches and not heard in second balance at 14 inches and cable was 4,000 feet long, our solution would be this: $\frac{14 \times 4{,}000}{14.5} = 3{,}862$ feet from office to trouble.

With foregoing simple apparatus it is surprising to note what accurate results are obtained. Results obtained, upon careful manipulation, are scarcely exceeded by the commercial type of Wheatstone bridge sets.

ANOTHER INDEPENDENT ASSOCIATION.

Representatives of Independent telephone lines of southwest Missouri, northwest Arkansas and northeast Indian Territory lately met at Gravette, Ark., and organized the Tri-State Independent Telephone Association, with officers as follows: President, W. T. Stahl of Siloam Springs vice-president, S. H. Slaughter of Fayetteville; secretary, K. J. Comfort of Westville; treasurer, W. D. Wasson of Gentry. The object of the association is the betterment of local and long-distance service. The association will also endeavor to devise plans for farmers' lines in its territory. The next meeting will be held at Fayetteville in June.

Iowa Telephone Convention

The opening session of the eighth annual meeting of the Iowa telephone convention was called to order at 8:00 p. m. by President Henry S. Herr, who appointed the usual committees and asked for the secretary's report, which follows: The report of last year's meeting was printed and distributed to members, and I have some copies here which can be secured by any of you who wish them. I have the following report to make as treasurer:

RECEIPTS.

March 10, 1903—Balance on hand	$382.86
Receipts from membership fees and dues	345.00
Refund from Western Passenger Association	11.00
Guaranteed on arbitration case	5.00
Total	$743.86

DISBURSEMENTS.

For stationery and printing expenses of last meeting and legislative expenses	$354.23
Balance on hand March 8, 1904	389.63
	$743.86

It was moved that the report be accepted and placed on file.

President Herr announced that Secretary Deering would read the president's address, which follows:

PRESIDENT'S ADDRESS.

This annual meeting of the Iowa Telephone Association should be one of the most interesting sessions since its organization. Never before in the history of Independent telephony has there been a greater need of wise counsel than at the present time. It is no prophecy to say that we are approaching a crisis which must be met with sober thought and sound judgment.

Independent telephony has passed the sentimental period, when people subscribed for the new telephone because it was in competition with a tyrannical monopoly. It is entering a new era, in which service and dividends are the principal factors—service to the people, dividends for those who invest their money. It is a business governed by business principles, which cannot be ignored with impunity. Therefore, let our deliberations be unprejudiced and unselfish, weighing well the questions that may come before us.

The association has been a great and permanent good to the companies of the state. By the interchange of experience we have learned many things relative to construction, operation and maintenance of telephone systems, that we, as novices, could not have learned so easily in any other way. The mutual encouragement has been helpful and will continue to be so as long as the association is wisely conducted.

Experience has taught us that cheap construction is the most expensive—a great waste of time and money; that the best apparatus is the cheapest; that operating and giving satisfactory service requires competent help and eternal vigilance; that maintenance is a large item in the expense account that must be cared for.

When the Independent movement began many hundreds of thousands of dollars were invested in the state in building Independent telephone systems, usually by men persuaded to invest in the telephone business by promoters whose only concern was to build the telephone system, furnish the material, take their percentage, and leave the solution of the problem how not to make dividends to the investors—persons usually knowing the least possible of the requirements necessary to successfully operate the telephone plant. In any effort to make the new plant pay, the operators failed to comprehend the entire situation, and ignored the fact that all receipts over operating expenses could not be considered a net profit; that with the best of construction, a sinking fund should be placed aside for repairs and rebuilding as the plant depreciated. The same mistake is being made at the present time by the so-called mutual or farmer companies.

Net profits cannot be considered before a depreciation fund is set aside. When that is done and the plant is paying 8 per cent dividend, the investment can be considered gilt-edged.

Notwithstanding the drawback in the past, the Independent telephone business has come to stay, and if the present owners cannot maintain it somcone else will. And while it came like a whirlwind, it will not go like the falling of a tree, as some have predicted. If there is any danger it lies in this: That we may be too independent—by which I mean too much divided—too many small companies. There is just as much danger in this as there is in companies being too large. Too many small companies require the time of too many persons to care for the amount of business done. There is not sufficient revenue for each small company to employ the necessary skilled workmen and all-around manager. When companies are too large, covering too much territory, the boards of trustees and managers cannot keep in close enough touch with all the departments and employes, but must do a large amount of work by proxy, which is, to say the least, unsatisfactory.

The telephone proposition is, in a measure, a repetition of the formative stage in steam railways and telegraph companies, and *now* that of electric roads. The railroads were built and equipped by smaller companies, and, for want of true business principles and uniform methods they became losing propositions and were sold out and absorbed in greater systems, and by shrewd management were placed upon a paying basis. It was the same with telegraph companies.

The electric lines in many places are experiencing the same thing to-day, with this exception: That many of the electric lines are profiting by the experience of the older transportation companies, and are merging with other companies so as to cheapen operation and increase their revenue.

In the telephone business it is just as important to combine for self-protection as in any of the other large industries. Losses by fire and storm and civic disturbance that would wipe out many smaller companies, and thereby cripple the neighboring companies, would fall very light on them if combined in one corporation.

The majority of men controlling Independent companies are skilled in other business, and have invested in telephones as a side issue. They are not practical telephone men and must depend on others to manage and operate the plant. As a matter of economy and self-protection it is necessary to devise some way by which the many companies can and will be managed by practical men. One practical and skilled man can just as easily manage a limited number of small exchanges as he can manage one. And it is better to pay one man a fair price and have good results, than to pay a dozen men less competent and have poor results.

The New Jersey Interstate Telephone Company, The United Telephone and Telegraph Company, The Cumberland Valley Telephone Company, The Consolidated Telephone Companies of Pennsylvania, all of them operating in Eastern Pennsylvania, New Jersey and Maryland, have been organized by combining nearly two hundred smaller companies and have traffic arrangements with each other, and control and operate nearly three thousand miles of toll lines, giving entire satisfaction to patrons and also paying dividends and splendidly maintaining their plants. One writer says "We learned the importance of combining by districts to meet competition, and for that purpose we combined. We found it a dividend paying proposition as well."

The Interstate Independent Telephone Company of Illinois has assured its stability by combining a number of systems under one corporate head, and is earning dividends and making securities better every day.

I have seen several articles on the subject of organizing on a mutual plan; whereby representatives of several companies in districts should meet and elect representatives to another or higher body, which should make rules and regulations governing all companies. Something on the order of the Methodist church organization. Considering the local telephone companies, the individual church, the quarterly conference would be represented by the district meeting, and the annual conference and the general conference by the state and United States. This might be all right, if all were Methodist preachers, and only Methodists to deal with. But all telephone managers and operators are not Methodists. Some are Presbyterians, Baptists, Episcopalians; they are of all denominations, and I have been told there are some Mohammedans and a few Pagans. Therefore, I believe it well to tie everything up in corporate papers, and tie them up so that none can transfer their interests to our common competitor.

The secret of success in the future for the Independent telephone companies lies in their combination and co-operation. Without combination I have little faith in the improvement of present conditions. Many methods have been suggested to this association in the past, but they have been found wanting and unsatisfactory.

We have advocated clearance houses and long distance toll line contracts, with the hope of having uniform action, and division of profits, etc. But in this we have not found a sufficient number of companies willing to put up the cash to make the experiment. We also find that the man who thinks he has the best of the bargain by keeping all he collects, will not agree to divide; and if you attempt to compel him by disconnecting his line or by refusing to do business with him, he suggests Bell connections. The man

who is able to build good toll lines, claims that his lines are good enough and that his neighbor shall not build into his territory.

These and many more difficulties are constantly coming up and being thrown in the way of successfully operating the telephone companies in adjoining territories. The matter of division of territory is also becoming a serious question in some localities where the paralleling of lines and the crossing into territory claimed by other companies cannot be avoided. From past experience, I have little faith in any method short of actual combination and merging of companies in districts, under one general management. The merging of companies in districts will not interfere with any practical clearance house proposition or Independent toll line connections, but will rather make it easier and more satisfactory, since one contract with such merged companies will represent the district.

There are over seven thousand Independent telephone companies in the United States, owning and operating three million telephones. The Bell company has less than two million telephones in operation. The Independent companies have more than twice the amount of money invested. If we unite them, fifty per cent can be secured easily. This large investment, made by the many small telephone companies has attracted the attention of moneyed men, and they are closely watching every movement. And where the Independent telephone companies have so fortified themselves as to assure their stability, make permanent construction and show net profit, there is no lack of funds for every purpose, and that, too, without going outside of the immediate localities.

In many places the Independent telephone companies are joining their interests by selling their holdings to a new company. By so doing they give better service; they are controlled and operated by one general management; local difficulties are entirely cut out and the checking of business is easily done. All expenses are paid from one fund, and all the companies share alike according to their interest in the new company. All have a common interest and work to build up the system and make it a success. All are stockholders in one common company and the stock is of more value than when separated. If extensions are necessary, it is easy to procure funds by bond or loan.

A plan something along this line will work in Iowa, but before it can or will, many Independent companies must do away with some of their pet ideas and be willing to have a fair value placed upon their plants, and to have them controlled by a board selected on account of its fitness for the position, the same as is being done by other large industries.

The state is too large to be operated by any one company, there being over twelve hundred small exchanges. Therefore, I advocate organizations by districts. Let the Home Telephone Company of Des Moines, and the companies controlling the several lines and exchanges in the counties adjoining, unite their interests on a common basis and place all under a competent general superintendent and a board of trustees to be elected from the different companies. Back them up with your proper support, and the property will be safe and success will be assured.

In my opinion, and in the opinion of men who have had experience in matters of this kind, the best way to accomplish this result and to combine our interest, is for the companies interested in certain territories to organize a stock company, each subscribing for a number of shares equal in value to his original holding. Then have the stock company thus organized appoint appraisers, who, together with the owners of the separate companies, shall appraise the property of each company. Then let the newly organized company purchase the holdings of all the companies, paying for them with stock of the new company to the amount of the appraised value, and then you have your object accomplished. Each company will hold its interest in the new company, and all will be under one general management which will represent the combined interests.

This can be done at Des Moines, taking in the surrounding counties as far as the contracting parties may consider advisable. The same thing can be accomplished at Council Bluffs, Sioux City, Cedar Rapids and Ottumwa, taking as many companies as the new company can control. This I consider the best plan. All other plans of co-operation and combining of companies so far advanced, to my knowledge sink into insignificance when compared with the merit and success of a company organized on this basis. It is well to follow the example of other industries which have found that combining interests meant success.

This will do away with all territorial disputes, and it will be an easy matter for the new organizations to arrange for through toll line service; to extend new long-distance copper lines wherever they may be needed; to contract for the service over such lines as are now built, in all of which the small company will share in the larger company proportionate to the amount invested.

No clearance house proposition that may be inaugurated, or toll contract, will add to the market value of your property as a combination by corporate papers can do. The clearance house managers can have no practical control of the several companies clearing through it. Someone may say, by contract you can compel. *Compel* means lawsuit; and lawsuits not only take money, but they are a guarantee of poor service.

This I consider the most serious, the most important, and the most pressing subject before the Independent telephone companies to-day. We have one common competitor to meet. This competitor can only be successfully met by combined effort similar to that outlined in this paper.

It was moved that the paper be published in the proceedings of the convention.

President Herr invited discussion on his paper, to which Mr. Doran, a member of the Iowa legislature, responded as follows:

We came here as spectators and to learn something. You should not expect us to teach you anything, for you know more about this business than we do. We only wish you success and prosperity.

Mr. Brooks, member of the Iowa Senate, spoke as follows:

I am like the member of the House who has just spoken—I came to hear you say "hello," and not to take any part in the proceedings this evening.

I am inclined to think that the telephone men in Iowa are a modest set of fellows; at least we have not had very many requests or calls from them over on Capitol Hill this winter. I assure you that if you have anything that you want us to do we will be glad to look after it for you. I don't think for a moment that this body is likely to ask anything that we would not do our best to grant, and there are some things, of course, coming up—a few things now, and there will be more in the future. The telephone business is new. It is expanding, it is true, as has been indicated here to-night, but it is a new problem, and it has yet to be fitted into the legal and social organization of this country. It has not found its place; it has not found bed rock; and it can only do that by experience, by the work on the line and in the homes and in the exchange, and in meetings of this kind.

I am very much pleased to see the representation here to-night and to see the interest which you evidently manifest in this great new enterprise. I say great because it is. Any device, any appliance will put us in speaking distance of one another all over the commonwealth of Iowa is certainly great. It is a matter of astonishment to me every day. I never go to a telephone, I never take down a receiver, without I am filled with astonishment at the possibility of standing there and talking with a friend. It is a great thing for our people; it is a great thing for us socially. It is a great problem in our business and in our every-day life, and as I have said, it is a new problem, and must have legislation. Whether you ask it or not, it will come; it will come out of the experience of the people; and that it may come along right lines; that we may not have to take too much back and do it over again, devolves upon you, gentlemen, as members of this association to study these problems and formulate them carefully, in order to cover as far as possible the needs of the telephone interests of Iowa. I know that you can not just sit down and evolve these problems on paper in a few moments, but out of your experience you can anticipate to a certain extent your needs, and in gatherings of this kind you can formulate and sift these.

I was very much interested in the president's paper; certainly there is very much in it for your consideration. I have been of the opinion for some time that along the lines indicated in that paper you will solve the financial problems, and not only that, the operating problems that goes along with them in the telephone interests. Now you are facing, I presume, the settlement of the toll matter—the clearing house problem. With your present numerous small exchanges all over Iowa, the idea is simply appalling to me. Some of these experts like Mr. Deering and Mr. Bandy and Dr. Herr may be able to grasp the problem of a clearing house with a telephone exchange in every school district, but I am free to say that it is too great a problem for me. But if you were to hit on some method of consideration—possibly the district plan, you would certainly make a long step toward solving the clearing house question

There are some few little problems in the legislature. We had a little problem up to-day, and we passed it in the senate without the aid of your telephone men. It is a law whereby the farmers can be compelled to trim the sprawling wind-brakes and line of trees along the lanes of Iowa. We passed it without a dissenting vote, gentlemen, so we are prohibiting them from permitting these limbs to extend more than four feet out into the highway. A little legislation along that line will be very helpful to the telephone interests. There is the question of lining up the poles that I had hoped would be solved this winter. We have a few measures touching this in the house. I have not kept close track of them; perhaps the officers of the association have. You know that problem. You must not get your telephone poles out into the highway; you must not get them into the farmers' fields; and your anxiety is to keep your wires straight when the line isn't straight, and you face that problem of building a straight line that will run parallel to a crooked line. I was in hopes that this organization, through its officials, would straighten that crooked problem this winter. I am inclined to think it could be done, and

it ought to be done. While I am up I might as well scold you a little, because I noticed a little inclination to scold us on the part of the Doctor, which is all right. It is by these knocks that we will get ourselves into line. I think you ought to come over and see us and tell us what you want and how you want it to come. You will never get anything from anybody else less generous than the Iowa legislature unless you ask for it.

P. C. Holdoegel of Rockwell City then addressed the convention on the subject of long distance lines as follows:

Long distance lines seem to me to be the great necessity of the Independent telephone movement. When we began in competition with the Bell company we had the entire field before us. We have covered it locally and covered it well, in many places to the exclusion of our competitors, in nearly all of the cities of Iowa; but we are not, as boys say, up against the proposition that takes distance toll line service. We offer local competition that takes I believe I am safe in estimating, seventy-five per cent of the toll line business. In our immediate territory it far exceeds that, although we have been unable to find out from the local Bell agents the amount of toll business that they do. From our territory at Rockwell City we now have very limited long distance toll line connections. We meet a copper line at Fort Dodge over which we get very good Des Moines service. We have, I believe, on some occasions talked successfully to Davenport, using an iron metallic line about thirty-five miles to Fort Dodge, and there getting the copper.

What we need is long distance copper lines. The trade demands it and we must have it in order to hold the trade. The next question is, how shall we get it and how shall it be operated.

As to how we shall get it I see three plans; and by the way, I believe the plan suggested by our chairman would be the best plan that we could use, if those among us in the different districts could all see our way clear to combine. And then the question comes as to whether local interests, which are so well cared for, might be overlooked by lack of close supervision; that is, by lack of the managers in the different localities looking strictly after the business of each locality. It seems to me that that is one thing that must not be overlooked in the organization of large Independent telephone companies. Our county, for example, has eight exchanges, and two or three more are to be built this summer. It must have local supervision, and there must, it seems to me, be somebody in that county, or in no very much greater amount of territory, who has direct charge of the details and management of the telephone service in the county.

The next best plan to that suggested by the president seems to me to be the organization of long distance companies to handle long distance business in connection with the Independent telephone companies. The stock of these companies, I believe, could well and profitably be owned by the local companies. For instance, I do not see why we might not have a copper line from Rockwell City to Des Moines owned by a long distance company, the stock of that company held by the three companies over whose territory that line passes. Or make it on a broader scale: let that include any number of counties with a uniformly constructed long distance circuit, the stock of that company held by the Independent companies, if they choose to hold it, under contract with the Independent companies to turn such business as cannot be handled on their local iron wires over to the long distance company. If the local companies should not choose to handle this stock, I believe investors can be found to take it; and we, for one, would be ready for any arrangement that would be equitable, wherever we can get long distance copper lines for operation.

Another plan, in the absence of a well organized copper line company, seems to me to have each company cover its pole lines with a good metallic copper circuit, so that the different companies may at least be united on a copper circuit. Then we find the objection of lack of uniformity of construction, lack of uniformity of apparatus in its equipment, and lack of uniformity in its management, as well as a lack of contralized control. I know in many places it is hard to locate trouble in long distance service because of the fact that a number of companies are interested, and no superintendent or foreman likes to be cornered down to acknowledge that the mistake is that of his office.

Another plan that has been suggested to me is that, entirely independent of the Independent companies as they now exist, there might be organized a long distance company to work in connection with the Independent companies to handle this long distance business. However, it is my opinion that long distance service will be found profitable to the Independent companies, however it may be brought about, even though it may seem to us at the time we may be entering into an arrangement with a long distance company that we are sacrificing our business interests.

Our business people are demanding an efficient long distance service in order to hold their trade, in order to keep them from the necessity of patronizing the Iowa Telephone Company. We must accommodate them with the service that they demand.

Regarding the long distance service, another point comes in which will be ably discussed to-morrow, that is, the clearing house for long distance service. If we can unite our system in regard to this long distance service, it will largely do away with the clearing house proposition, as was so ably discussed by our president in his paper.

President Herr said that Mr. Holdoegel had not grasped his idea, and suggested that local interests would be better taken care of, as a rule, than they are now, because an expert would look after all matters in a district, where neither one of the divided companies would be able to have an expert.

Mr. Holdoegel answered by saying that he may not have made himself clear regarding the possible lack of local supervision in doing away with the local manager and making the districts larger. He contended that there were many little points of detail in the organization of lines, the building of exchanges and little local matters that might perhaps not receive the attention that they should receive.

Secretary Deering opened the discussion on the subject "The Farm Line Proposition," which follows:

On this subject Mr. Atkinson of Creston spoke as follows to the convention:

Just at present I am not handling any farm line business, and I would rather hear from the men who are. You know that the farm line business is being handled in a number of different ways throughout the state; you might say that every company has its own way of handling it. The company north of here encourages the farmers to build their own lines and equip them—build their lines to the city limits and the operating company furnishes them a pair of wires to the corporation line and charges them 50 cents per telephone per month; the farmers put about ten telephones on a line. Another company encourages the farmer to do the same amount of building and equipping and charges him so much—a connection and switching fee of, say, five cents. That is done in a great many cases. Still others build and equip the entire line and rent the telephone to the farmer the same as they do to the city subscriber. Those rental rates vary. One man charges $1.00 a month, another $1.25, another $1.50; and each man thinks that he has solved the problem until he runs up against a bunch of farmers that don't agree with him, and then trouble ensues.

Personally I favor the idea of having the operating company build the line and equip it. Their business is the telephone business. If the farmer puts in his own equipment, one telephone on a line is one make and another is another; the bells are wound to different resistances, the service is poor, and the operating company gets the blame.

Then another method that has been followed by some companies is to get the farmer who wants a telephone to buy so much stock. The operating company then builds and owns the line, charges the farmer the regular rental rate, whatever it may be, and the farmer in return gets whatever there is in the way of dividends coming to the stockholders in the company, or helps pay the loss, as infrequently occurs.

As I have remarked before, the Mutual company of Des Moines is not at present handling any farm line business, and so for the present I am not deeply interested in this discussion.

We haven't had any trouble with the farmers, but we are just getting into the farm line business. What lines we are putting up we have metallic. We have only three farm lines that belong to the farmers; those we take in at fifty cents a month. The rest we get for $15 a year—five year contract, a year in advance; and we have no trouble. We get more business than we want. We give them as good service as we can, and they seem to think we are using them about right.

I have a system of calks that I think helps the operator. For a long call, I use the figure 5; for 1, 2, 3 and 4 I use the figures representing short rings. The lines we letter instead of number—A, B, C and D; and when we get through the alphabet we double them. So that 51 would be a long and a short on A line. I have them call by number, using no names at all. It saves time in checking and in answering questions, and the operator knows immediately without anything to commit to memory. When they call they give the number, and by giving the number they give the operator the call, and I think that the trouble in calling is considerably reduced.

Following Mr. Atkinson, Mr. Griswold told his troubles on the farmer problem:

There is no branch of our business which causes us more trouble, perhaps more difficulty, than the farm line proposition, and I presume we have as much or nearly as much of the farm telephone business as any company operating in Iowa. We have built all of 1,000 miles of farm lines, and have something like 1,600 subscribers of our own, and connect with probably forty or fifty other companies owning their own lines.

We have all sorts of arrangements. We build the line and equip and maintain it, charging $1.25 per month or $15 a year for unlimited service. We give service over such lines wherever they

extend. It is practical in a great many localities for a farmer to reach a dozen different towns from his telephone without payment of any toll charges, yet in a great many instances they don't seem to be satisfied and don't think they are getting the worth of their money. On the other hand, we have had a great deal of difficulty with the farmers building and operating their own lines. A great many of them have come up to our telephone exchanges and demanded connection free, which in every case we have refused.

We have a few lines which are paying us $5 per year for each telephone on the line. We give service with the local exchange to which the line is first connected, and then we give the right of way over the balance of our rural lines and allow subscribers the privilege to talk as far as those lines extend without the payment of any toll. In a great many other cases we have arrangements where we give one exchange—in the town to which their line is built, and we charge them $2 a year for each telephone on the line for switching, which isn't enough, by the way, but it seems to be all that we can get, and rather than have opposition or competing exchanges, we have taken quite a number of those lines in on those terms.

But the tendency among the farmers generally is to have the telephone company build their lines. Two years ago the tendency was nearly the other way, and it seemed to me at that time that the farmer was determined to build his own line, own his own telephone and operate it; but as they have had more experience in the business they have learned that the farm telephone business is not all roses by any means, and are willing to let the telephone man worry with it. Personally, I would rather they would build and operate their own telephone lines, if they would pay us $6 a year.

And then a Mr. King, a real farmer and builder of farmer lines, contributed his views:

Gentlemen, this is rather a hard place for a "hayseed" to say anything. We seem to be rather in the minority. I have found since I have been here but two representatives of purely farmer lines, which includes myself and my friend who is with me from our county.

About three years ago, in the township in which I resided, which was about twelve miles from Vinton, there was held a meeting to talk up the building of farm lines. I think that was before any had ever been built in the county. I was not present at the meeting, but I understood a gentleman was there who talked over the problem and explained the cost of building lines, equipment, and so on; and I was told at that time (although I may be wrongly informed) that a company would agree to take the farmers on—furnish the lines to all who wanted them, at either $10 or $12 a year. The company would not undertake to build any farm lines. For the company to equip the lines we were to be charged $1.50 a month or $18 a year for service. We thought that was too much, and in the little town of Urbana we commenced to build farmers' lines. It was an experiment. We didn't know whether they would last a year or not. It was on the Cedar river, where there is quite a good deal of oak timber and we put in oak poles—everything that came along, from 14 to 16 to 18 feet high. Some cedar pole entered into the construction, but not much. We started a little exchange there with perhaps 100 or 150 telephones through the township and in the little town.

About three years ago I moved to Vinton, the county seat. I went into an office at that place before I had been there very long, and called up central and asked for Shellsburg. The question was asked me, "Who are you?" I told. "Where are you?" I gave the information. "Will you pay Mr. Thompson fifteen cents?" I told the operator that I had never stole anything in my life. I reflected then that in Vinton in less than five years there would be a telephone system where a man could ask for anything within reasonable reach, and wouldn't have to tell who he was or what he was or what his business was, only to the man he wished to talk to, providing he could get him.

Under the arrangement of business at that time I presume it was necessary to do those things. Of course we all get beat in our business at times, but it seemed to me it was an unnecessary expense. While I may have been away off, it must have required extra help at the switchboard to ask those questions.

We started in to build an exchange, and commenced on the 5th day of August, 1902, with, I think, five farmer lines, and about sixty subscribers. To-day we have twenty-six farmer lines with a little over 300 subscribers, and we have what we call commercial lines to these different towns.

We know that no other company can equip and maintain a line as cheaply in a town as the farmers can equip their own, providing they will do it. On our lines we have the necessary instruments to work with. If anything goes wrong we have one or two young men to go out and look after it, and if they can't fix it we take our trouble to town and are charged whatever it is worth.

My advice to any company is, if the farmers want to come into their exchange, take them in and give them a reasonable switching fee, rather than have another exchange. I believe you will all agree with me that the farmers can maintain a line cheaper than any central company can do it.

Sometimes in our feelings toward each other, we get off the main point. I venture the assertion that if the men in this house were asked where they were born, nine-tenths of them would say, on a farm. I want to ask you if you think all the cussedness was left on those farms when you left them, or if you think you took all the brains with you?

Any man, I don't care where you find him, who has acquired a competency on the farm, has done it by work and economy. They can't get wealthy in any other way than by close living.

I don't believe that the farmers have any business in the telephone business, but I do believe that any exchange, with economy and fair usage, could take care of the farmers at a rate of $12 a year. I will tell you why I believe it. I have seen in our county a line four miles and a half long with one telephone on it. He was under a contract of $24 a year for three years. From the fact that the company now has a farmers' line there with twelve or fourteen subscribers on it, the revenue is $144 in the year in place of $24. Of course, the other telephones have to be maintained, but that expense is not excessive.

Mr. Bellamy followed Mr. King with these remarks:

I have listened to this discusison with a good deal of pleasure. The gentleman who has just taken his seat is probably correct when he says the most of us were born on a farm. I have been in the telephone business about six years. Three or four years ago I began to realize that it was absolutely necessary to take care of the farming community—not because I needed the business, but simply because they needed telephone service worse than anybody else. Having been raised on a farm, I know what it means to live in a community where you are isolated to a certain extent from your neighbors. Realizing this, when the farmers first commenced talking to me about telephones I went to their meetings, and after discussing every phase of the question we adopted a plan that is different from anything that I have heard mentioned here to-night, and we have pursued that plan to a great extent for about three years.

I have built in my county to all of the smaller towns and post-offices. We have several towns ten or twelve miles from the county seat which are not on railroads. As a matter of fact, I guess it is true that in our county we have a town that is farther from the railroad track than any other point in the state of Iowa. We had toll stations there. They were fairly profitable, but at one point I went out and discussed this matter. This town is some twelve miles from Knoxville, and the question came up as to what was the best way to get Knoxville connections—what was best for them and what best for me. To build a line twelve or fourteen miles long and give them any kind of service would cost a good deal of money. I had a good metallic line out there, and I proposed to furnish a switchboard without any expense to them if they would take care of it. They built their lines into the board and employed their own operators. I take any message that originates on their line, and deliver it to any exchange in the county for ten cents. We treat them just as we do any other telephone company. If they want to charge the person telephoning who is not a stockholder twenty cents, they keep half of it. In some instances they do that. We have four of those stations. At my own exchange at Knoxville, at Pleasantville and several other exchanges, those living near by, some of them, have built their lines in, and we take them in on a flat rate per line. Others we take in on a switching charge of five cents, while a good many of them have furnished the poles, and I furnish the wires and take care of the lines, and charge them $1.00 a month.

I find that in dealing with these men I have no trouble. They like to drive good bargains, and they generally get the best of it, I am frank to say; but it seems to me that there can be no cast-iron rule laid down by this association to govern everybody. But we must keep in view this fact; that if a farmer down in Keokuk county wants to talk to one up in my county, he will have to have some way to do it. He is just like any other business man.

Now in some places, especially in the south—in Lucas and Warren and Monroe counties—they have built lines of their own. Some places they have exchanges of their own. They have run them for two or three years, and now we are negotiating to consolidate. When they started in in this business they concluded they could operate their exchanges for $1.00 a year apiece. All these farm exchanges that I have spoken of have increased their rate to $2.00 apiece, and are not now, probably, paying expenses. I believe that this question will work itself out all right and there will be no trouble about it. We want to realize the fact—and farmers are going to realize it, too—that a streak of wire on a few poles with a lot of telephones tied to it isn't a telephone exchange or telephone service. They are going to demand as good service as we give in town, and they are going to get it, and they are going to pay for it. I had two men come to my office yesterday morning that are on rural lines and they want to make some arrangement for better service. I find there is a good deal of dissatisfaction existing wherever I go, unless they have good service. They deserve good service and they are willing to pay for it, but they are not going to pay you $12 or $15 a year for service that isn't worth twenty-five cents a year—they are too smart for that.

If we are going to stay in the telephone business we must

formulate a plan where every man in the state of Iowa can communicate with every other man. If we don't do it somebody else will, because the demand is here, and we might just as well get ready to build copper lines. If we don't do it we are going to be out of the business, and the time isn't very far distant.

If you have a telephone system by which you can accommodate everybody who comes along, there isn't going to be any need for anything else. I don't think there is very much danger of the farmers connecting with the Bell company, because there is nothing at the other end. The question is, how are we going to take care of the business that comes to us.

The various papers and the report of the proceedings of the Iowa convention required two hundred typewritten pages of manuscript. We have devoted considerable space to the first day's session because it involved important matters concerning the "farmer question."

At the Wednesday morning session H. E. Ralston of Maitland, Mo., addressed the convention at considerable length on the subject, "Jealousy Among Telephone Men." The abstract of Mr. Ralston's address will appear in a subsequent issue of TELEPHONY. A general discussion of this gentleman's remarks followed, after which papers by J. C. Thorne, Hall H. Patten and H. A. Kinney were read. Two of these papers appear in another part of the current issue. The discussion following the reading of these papers developed sentiment in favor of the plan proposed by President Kerr in his opening address.

At a special session of the convention, Wednesday afternoon, papers by J. M. Plaister and D. M. Griswold were read. These papers appear in the present number of TELEPHONY, and the discussion resulted in a vote to express the sentiment on the clearing-house proposition. Following the vote it was proposed that the companies in favor of a mutual traffic agreement should meet separately to formulate some definite plan, the same to be reported upon at a session the following day.

S. S. Lichty, chairman of the committee on resolutions, presented the following expression of regret on behalf of the association for the death of H. C. Raney:

Whereas, Since our last annual meeting, this association has suffered the loss of an honored member and efficient officer in the death of the Hon. H. C. Raney, of Fairfield. Therefore, be it

Resolved, That in annual convention assembled, we do deeply deplore the death of this firm friend and co-worker in our association, and that we tender our profound sympathy to the bereaved family, and we recommend that a copy of this resolution be spread upon the minutes of the convention and a copy be sent Mrs. H. C. Raney.

The action of the postmaster general excluding Independent telephones from postoffices was condemned with appropriate resolutions.

Considerable interest had been centered upon a banquet that was to be given by the association on Wednesday evening. According to the program about two hundred members of the association, accompanied by their friends, participated in an elaborate spread at Circle Hall. Following the banquet U. S. Alderman, acting as toastmaster, called on A. B. Cummings for an address, which was largely in the nature of a welcome. Hon. Lafayette Young spoke on the subject, "A Long-Distance Hot Wire." A. L. Urick spoke on the "Relation of Employer and Employee." Judge Nichols responded to the toast, "Service."

At the Thursday session, discussion centered upon the proposed measure introduced before congress by Senator Fairbanks of Indiana. It was also announced that a plan had been formulated to establish a clearing-house for the toll service of Independent operating companies. The plan proposed was adopted by unanimous vote and the report provides for the incorporation of a stock company to be known as the Central Telephone Traffic Association. The capitalization is placed at $10,000, and no company is to hold stock in access of one share. Des Moines will be headquarters and the business will be in charge of a salaried manager.

At the conclusion of Thursday's meeting the following officers were elected for the ensuing year: J. C. Sullivan, Creston, president; S. S. Lichty, Vinton, vice-president C. C. Deering, Des Moines, secretary and treasurer; J. S. Bellamy, Knoxville, J. C. Thorne, Fairfield, P. C. Holdeogel, Rockwell City, and U. S. Alderman, Nevada, form the executive committee.

Among the manufacturers and supply houses represented were the following:

Miller Anchor Company, Norwalk, Ohio—C. H. Miller.

Eureka Electric Company, Genoa, Ill.—H. Rosenow and I. J. Kusel.

Sterling Electric Company, Lafayette, Ind.—W. E. Doolittle and F. A. Freer.

Western Telephone Manufacturing Company, Chicago—Jas. E. Keelyn.

Vought-Berger Company, La Crosse, Wis.—M. I. Berger, Geo. H. Pierce and G. O. Lundgren.

American Electric Fuse ompany, Chicago—J. A. Kenny.

Automatic Electric Company, Chicago—H. L. Durant, F. Lucia

American Electric Telephone Company, Chicago—P. J. Eubanks W. R. Hauptman, H. P. Blackledge.

C. J. Huebel Company, Menominee, Mich.—C. J. Huebel.

Swedish-American Telephone Company, Chicago—E. B. Overshiner, F. M. Ferguson, R. L. Scott.

North Electric Company, Cleveland, Ohio—F. F. Sapp.

Kellogg Switchboard & Supply Company, Chicago—W. R. Hind.

Monarch Telephone Manufacturing Company, Chicago—W. H. Trimm, H. C. Mock, A. J. Carter.

Geo. W. Conover Company, Chicago—Geo. W. Conover.

Chicago Writing Machine Company, Chicago—Mr. and Mrs. F. W. Pardee.

Stromberg-Carlson Telephone Mfg. Company, Chicago—W. H. Bowen and H. A. Jones.

Illinois Electric Company, Chicago—N. G. Harvey, M. McNeill.

Valentine-Clark Company, Chicago—F. L. McMillen.

Gould Storage Battery Company, New York—E. L. Draffin.

Jno. A. Roebling's Sons Company, Trenton, N. J.—W. J. Crawford.

Standard Underground Cable Company, Pittsburg—E. J. Pietzcker.

Wittenberg Cedar Company, Wittenberg, Wis.—M. L. Arnold.

Modern Electric Company, Burlington, Ia.—D. C. Bell.

Central Electric Company, Chicago—C. A. Felker, J. W. Mason.

Electric Appliance Company, Chicago—S. A. Dinsmore, Leon Bly.

Page & Hill, Minneapolis, Minn.—J. E. Dodds.

Telephony Publishing Company, Chicago—Elmer E. Smith.

Following is a partial list of operating companies represented:

Fremont County Telephone Company	Thurman
Creston Mutual Telephone Company	Creston
Mutual Telephone Company	Des Moines
Hawkeye Telephone Company	Des Moines
Norwalk Telephone Company	Norwalk
Johnson County Telephone Company	Iowa City
Jasper County Telephone Company	Newton
National Carbon Company	Cleveland
Vinton & Benton County Telephone Company	Vinton
Jefferson County Telephone Company	Fairfield
United States Telephone and Telegraph Company	Waterloo
Dayton Telephone Company	Dayton
Fort Dodge Telephone Company	Fort Dodge
Audubon County Telephone Company	Audubon
E. H. Martin Telephone Company	Webster City
Nevada Mutual Telephone Company	Nevada
New Sharon Independent Telephone Company	New Sharon
Mitchellville Telephone Company	Mitchellville
Harlan & Avoce Telephone Company	Harlan
Central Mutual Telephone Company	Rockwell City
Madrid Ice and Telephone Company	Madrid
Farmers' & Traders' Telephone Company	Wright
Afton Mutual Telephone Company	Afton
Guthrie Center & N. W. Telephone Company	Guthrie Center
Farmers' Telephone Company	Dallas Center
Woodbine Telephone Company	Woodbine
Delta Telephone Company	Delta
Hanamo Telephone Company	Burlington Junction
Boone County Telephone Company	Boone
Gravity Telephone Company	Bedford
Hedrick Telephone Company	Hedrick
Spencer Telephone Company	Spencer
Chariton Telephone Company	Chariton
Chariton & Newbern Telephone Company	Chariton
Central Iowa Telephone Company	Iowa Falls
Ottumwa Telephone Company	Ottumwa
People's Telephone Company	Sigourney
Wells Telephone Company	Woodward
Oskaloosa Home Telephone Company	Oskaloosa

QUESTIONS AND ANSWERS

Conducted by J. C. Kelsey, Purdue University, Lafayette, Indiana.

In the February issue of TELEPHONY you have a description of a "volt-meter test circuit for a common battery exchange." I wish to ask how the man testing can furnish battery, or talk to the subscriber whose line is up for a test?—J. H. S., O.

On page 99 of February number, the circuit of the testing apparatus has been described by Mr. Coar. Your objection is quite right, because with a single cam key the circuit cannot be made to do more than one thing at once. The inspector, by throwing key *d* back, as shown in drawing, cuts his telephone set onto the talking circuit and derives his battery from the operator's cord circuit. Quite right, so far. The article says that by throwing *d* key forward, that both tested telephone and the inspector's telephone will be supplied with battery. It is an error, for if key *d* is thrown forward, the inspector's telephone set will be supplied with battery, and as the key can only work one way, the tested telephone is not in communication at all. If, however, the key *d* was separated, into single keys with respective cams, then to supply both parties with battery, one key would have to be thrown back and the other forward. Figure 1 shows a separation and a different connection to accomplish this result. I am pleased to note the interest taken and I feel that J. H. S. deserves a vote of thanks. Let us hear from Mr. Coar in regard to his circuit. There are many chances that drawings may not always be right. For my part, I am inclined to go farther than J. H. S. and find fault with another statement. That is, in first paragraph, where he says "and will give good service whenever a voltmeter reading will suffice in locating trouble." I think that a voltmeter reading will suffice for every trouble, to find resistance accurately from five ohms to thousands of ohms. It should be made to do everything in the way of testing, from wet spots down. And I prefer the series method too. Then a curve can be plotted, and enlarged, placed directly over the inspector's desk, and he then will have the most rapid direct resistance reading instrument in the market. I would like to see an active discussion in the columns of TELEPHONY from the wire chiefs. This work is vastly important.

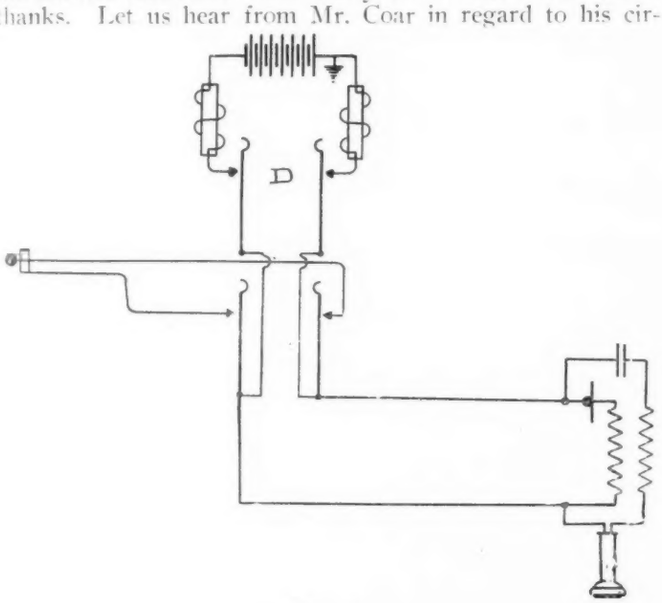


FIG. 1.

What size condenser should be used in the secondary circuit of a bridging telephone instrument in order that central can ring through on long lines when several receivers are off the hook. Which is better, one or one-half microfarad condensers? We have a grounded system of iron wire. There are twenty-five subscribers on the line, which is twenty-one miles long. We do not feel able to relieve congested condition by stringing other wires.—W. N. P.

A condenser of very small capacity would serve to relieve the condition, which would go to show that a one-half microfarad would be superior to a one microfarad condenser. If you are bothered extensively by marauders of the family telephone line genus, it would help matters to put a 5,000-ohm non-inductive resistance coil in the secondary circuit of each subscriber. Being non-inductive, it would not impair the listening qualities of the receiver and would act as a bar to the ringing currents. A half microfarad condenser has a high resistance to ringing currents, being of such low frequency, and probably would serve the same purpose as the 5,000-ohm coil. A small German silver coil would make a more convenient thing to handle than a condenser.

We have a metallic bridging party line of No. 12 wire. Sometimes when one party calls another speech is very faint and one can hardly hear the other, but in a little while it becomes loud and natural. What is it?

In connecting instruments to the line, must the same side, that is, the right or left, be connected to the same line wire in all the instruments, or does it make any difference? Must all the batteries be connected alike to all instruments, as, for instance, the carbon to the right side of the instrument, and the zinc to the left side? Should the pole piece that is on the striker, in the ringer movement, be so adjusted as not to come into contact with the armature of the bobbins. On some of the instruments it comes in contact and seems to want to stick fast to them.—J. N. J., N. D.

The faint talking and final clearance of the trouble in a few seconds would indicate that the hook switch of the instrument or instruments in question is very weak, and does not readily close the talking circuit. As one side of the receiver circuit is permanently in the line circuit, it would allow some talking over one side of the line, which fact you mention. The hook switch closes after it is given a blow, as it is human nature for a talker to shake a telephone that won't work.

It is a good plan to have some uniformity in instrument wiring. While it makes no difference in the operation of the telephone, it might be easier to find trouble if zinc was connected a certain way, and the left hand binding post to certain side of the line. In grounded selective ringing it is imperative that the posts shall have a definite side. In ringer adjustment, it is a good plan to arrange the striker, so that it normally misses the gong. When put in motion, it will be carried over against the gong by its impetus, and some energy is stored in it as a spring, which causes it to fly back sharply, which helps the magnetic effect exerted by the other magnet. The armatures should touch core of bobbin, in preference to striker touching the bell gong.

In measuring for cable trouble, I find that the battery from the exchange affects the instrument, or galvanometer. How can I avoid this? Opening main battery switch at the office does not help. My

test set is Queen Acme Portable. Please give formula for finding shorts and grounds in cable.—New. Tel. Co., Ohio.

For a formula I will refer you to Kempster B. Miller's work, American Telephone Practice, which I believe ought to be in the hands of every exchange operator. In testing for a ground, you encounter the usual difficulties of those locations where the trolley line is in evidence. It causes a difference of potential, fluctuating in character between the

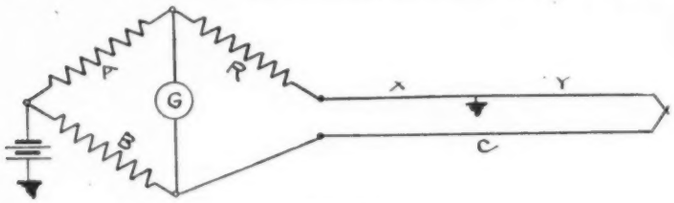


FIG. 2.

exchange and any grounded point in the cable. It naturally affects the galvanometer. The exchange battery should have nothing to do with this fluctuation. You might make a test *after* the cars stop running, for the fluctuations of earth currents are generally missing after the cars stop. An ordinary cross should not have any fluctuating trouble and should be considered as one arm of your bridge, which you compensate for by pulling out resistance plugs until the needle goes to zero. The unknown resistance is equal to the ratio between B and A, constant resistances, multiplied by the resistance in the adjustable arms. If arms A and B are equal, then X would be equal to R. For grounds, the Varley loop test method is efficient. In Fig. 2, A and B are arms of a bridge in which the common point a is attached to battery and ground. R is attached to faulty wire in which X is the resistance of the wire to the fault. The other arm of the bridge extends through the loop, of which C is the resistance of the good wire, and Y the resistance of the wire to the fault from the end connection with C.

A balanced condition of the bridge becomes when

$$\frac{A}{B} = \frac{R + X}{C + Y}$$

$$K = X + Y + C \text{ or } C + Y = K - X.$$

Let K be resistance of entire loop, then

$$\text{If } C + Y = K - X, \text{ then } \frac{A}{B} = \frac{R + X}{K - X} \text{ and } X = \frac{A\,K - B\,R}{A + B}$$

$$\text{If arms A and B are equal, then } X = \frac{K - R}{2}$$

If size of faulty wire is known, the distance in ohms per foot is easy to find.

We are bothered by every little electrical storm burning out our drops, and also by them becoming grounded to the panel by way of the core. We have put in a new ground and split and made thinner the mica strips between our carbon arrestors, and are using German silver fuse wire. However, we have just begun the use of it. Our old fuse wire when burnt out would not melt, but would seemingly carbonize and maintain its continuity. Would it be possible for high voltage current to carbonize this fuse and still go through it to the drop? Our long country lines cause most trouble. —B. H. Tel. Co.

It would seem that you have not had a good ground connected by a perfectly straight wire. Ordinarily, the arrestors take care of the lightning discharges, but it is not always true that fuses are blown. I have known of arrestors at subscriber's station that were melted into an unrecognizable mass, and yet the fuses did not go, and the instrument was unharmed. Fuses do seem to have the tendency to soften, as it were, when heavy current was passing, and continue to carry current without blowing. I am sure that the manufacturer of those fuses would be glad to remedy the trouble you mention. I do not see how they could carbonize, yet they do sometimes seem to change color. They are surely defective. A good ground for your arrestor terminals and a removal of the seeming good ground on your drop panel would serve to help protect the drop windings. The action of the lightning would tend to prove that your drop panel had better ground connection than the arrestor panels.

In January TELEPHONY we asked for information on a very puzzling case of trouble in our switchboard. As the trouble is not yet cleared, and some of your subscribers have asked for further information, we take pleasure in furnishing the following: The system is two years old, with No. 12 copper return. Have a few grounded local lines, four grounded farmer lines, one grounded and one metallic toll line. There are carbon block arrestors at the cable pole, and fuses at distributing rack. The Kellogg switchboard runs metallic to the distributing rack. The cable pole is in the alley. The electric light system has a 2,000 volt primary and 100 volt secondary. The nearest primary wire is across the street from the office. The office is an old frame building, as shown in Fig. 4. The trouble complained of is a roar, or loud noise in the operator's receiver, which persists whether the plugs are in use or not. It is worse on damp and muggy days. When the operator walks under the light the noise is so loud that conversation cannot be heard. When she walks the length of cord back of switchboard the noise almost ceases. It can be stopped at any time by the operator's hand touching the transmitter, or any metallic part of the board. Touching the transmitter, receiver tips, or booth transmitter, gives a burning sensation to the hand. We have tried the cable bonded, and not bonded, the return grounded and reverse. Touching one tip of the receiver to a transmitter makes a hum. Removing the operator's receiver plug from the jack stops noise, but bringing the plug within three inches of the transmitter starts it, and upon touching the transmitter the noise is same as when the plug is in the jack. Operator touching hand of party in connection with common return stops the noise. The booth telephone acts the same, although touching the transmitter does not stop the noise effectually. A telephone placed in the room entirely disconnected gives out a very noticeable hum. We hope that some of your subscribers will suggest a way of stopping the hum other than that of bonding the operator.—E. O. C. Co.

This trouble has been given to the readers before. It seems to be a purely local trouble, from the fact that the

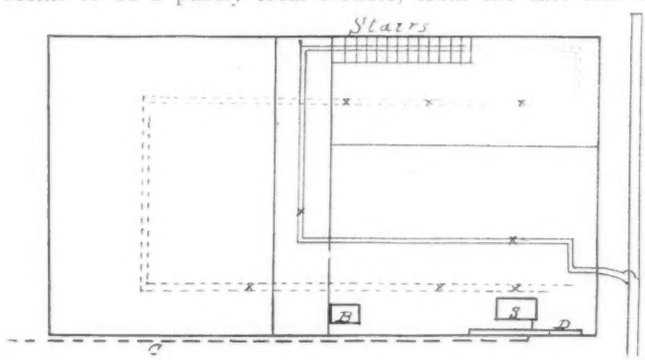


FIG. 4.

S—Switchboard. D—Distributing Frame. C—Cable. X—Drop lights. B—Booth.

booth receiver and the operator's receiver are alone affected. From Fig. 4 I would say that the trouble came from a defective transformer, which is hung on the outside of the building very close to the switchboard. Such a trouble could come from a cross between the primary and secondary windings, which would put a 2,000 volt potential with regard to the earth on the secondary wires. It might be exceedingly dangerous to the employes, or may not be, according to conditions of line outside of the telephone office. But this leak on the secondary wires flows electrostatically to the nearest earth connection, which is the common return. The return may not be grounded, but it is the nearest thing to ground. The fact that the noise ceases as the operator goes behind the board goes to prove that the path of these alternating surges of static electricity is from the lamp wiring to the common return. The position behind the board is the position of weakest potential and the noise in the receiver the least. If she walked more than a cord's length behind the board and placed her receiver a few inches from the return, the noise could not be heard

at all. Walking about the office, the intervening room space has the greatest potential, and the noise is greater, as the case of the operator walking under the lamp. The burning sensation is not strange and can be felt by any person holding their finger close to a moving belt in a power house. It indicates a high static potential. I am satisfied that if the transformer (I am assuming that you have one for the building you are in) is tested out, there will be found to be a cross between the primary and secondary, thereby exposing you to a dangerous potential and even to fire. It is common that transformers of the 2,000 volt type become punctured, and the fact has caused several deaths in our country. If you can get permission, open connections and test with a magneto for insulation between primary and secondary windings, and if you get a ring, demand a new transformer. The noise that you hear is the hum of the machinery of the dynamo that furnishes the light. That proves the cause and source of the trouble. If your transformer is a good one, it will thoroughly and perfectly separate you from the power plant, being only in inductive relation. If this is not the trouble, I shall be pleased to hear from the E. O. C. Co. and all other readers. If this noise happens when the electric light plant is shut down, my theories are idle ones. However, I am willing to stake something on the transformer cross.

Will you kindly explain the operation of the circuit shown in Fig. 3? What is the object of having parallel windings in the primary of the operator's induction coil? Why is condenser used? What is the object of C and D windings? Through what coils does the current flow when B operator is receiving a message? When the operator gets a busy click does any current pass in D winding?—A. L. P.

This is a two-party automatic ringing trunk circuit with but one signal, which is a disconnect signal. A call comes over the order wire from the A operator, which B receives in receiver R. B assigns the trunk to A, who immediately inserts her calling plug. B at the same time picks up her plug and makes a test. If the line is busy, she receives the click in her receiver, by a current being induced in the local circuit composed of B, C, D and E. If not busy, she inserts plug and lights the lamp marked disconnect signal. When A plugs in, the tip of her plug puts a ground on the trunk, which causes battery to flow through No. 81 relay and pulls a 40-ohm shunt, marked No. 25 special, around the lamp, which puts it out. The No. 25 special, besides acting as a shunt, acts as a controlling relay and governs the supply of alternating current for either key. When B sets the key of the party on a particular side of the line, the alternating current flows through the relay marked 200 ohms, out on the line through the condenser and bell. That current has not strength to act on the 200 ohm relay, and the ringing continues until the telephone is removed from the hook. This act throws a low resistance across the line, which causes the 200 ohm relay to attract its armature, which pulls the springs of key No. 160 from the generator contacts and the ringing stops. When the telephone is removed from the hook, the relay No. 25A is actuated and it puts a ground on the ring side of the A operator's cord circuit through the other winding of No. 81A, and causes the No. 25A relay on the A operator's cord circuit to shunt out her calling lamp and shows the party has answered. When the B party hangs up the receiver, the No. 25A at B is released, and takes ground off the ringing side of the trunk circuit, and lights the A lamp. A withdraws her plug, which releases No. 81A, which in turn releases No. 25 special, and lights the disconnect lamp. This causes B to pull down connection and assign trunk to someone else.

The object of the parallel windings of the primary is to prevent side tones. Part of the current is deflected from its real primary by the shunt. The condenser is placed in the transmitter circuit to overcome the effect of the 140-ohm retardation. Without the condenser, the operator could not make a sound to anyone. The induction coil is commonly known as the No. 24 and is of rather late origin. It is supposed to prevent side tones, but its greatest value is for B operator work, as it has a closed secondary at all times. This is necessary when testing is done. In the old coil the secondary of the B operator would be open were it not for the ring-down drop of 500 ohms bridged across the line. This is an improvement.

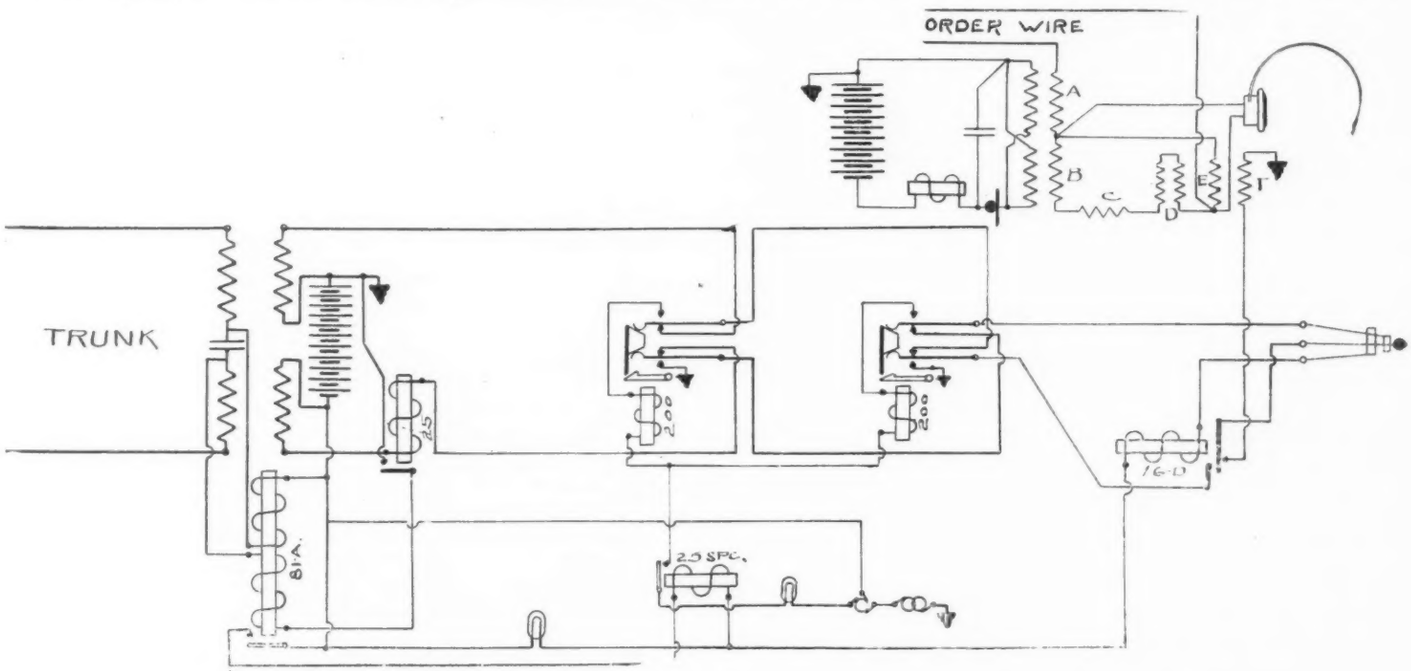


FIG. 3.

The largest single extension to a telephone switchboard in America has just been completed at the exchange of the Home Telephone Company, Toledo, Ohio. This adds a thousand telephones to the capacity of the exchange, making the full equipment 7,000 lines. The work was done by the Sterling Electric Company of Lafayette, Ind. The cost of this extension was about $29,000.

Reorganization of the Michigan Bell

J. B. WARE.

EARLY in December last the United States district court at Detroit confirmed the sale of the property of the Michigan Telephone Company (Bell) by the Union Trust Company as receiver for the bondholders. For the purpose of reviving the Bell telephone interest in this state the Michigan State Telephone Company has been incorporated, and the plan of reorganization includes the ultimate issue of the following:

First mortgage bonds, 5 per cent	$10,000,000
Preferred stock, 6 per cent	4,000,000
Common stock	6,000,000
	$20,000,000

For the purpose of paying the expenses, salaries and commissions of those identified with the receivership, also of the bondholders' committee and the reorganization committee, and to furnish means of payment for the Michigan Bell property, the new company is to issue, immediately, the following of the above authorized capital:

First mortgage bonds	$ 4,466,000
Preferred stock	2,285,000
Common stock	3,500,000
	$10,251,000

Certain facts connected with the telephone history of the state are of especial interest at this time. The Michigan Telephone Company was incorporated in 1883. In 1899 the Erie Telephone and Telegraph Company, under President Glidden's management, purchased the control of the company and promptly increased the stock issue from two and one-half millions to five million dollars; and the bond issue from $785,000 to $5,000,000. With a part of the proceeds of the sale of the increased stock and bonds was purchased three opposition companies and the control of the New State company, the said four companies operating 10,880 telephones.

In order to secure control of the New State company for the purpose of sale to the Bell the officers of said company issued a circular to the stockholders, explaining that it would be advantageous to increase the stock of the company and secure funds to take care of the very large growth of both exchange and toll business, which was crowding upon the company. They secured sufficient proxies, which they had prepared in such manner as to give power of attorney to the party receiving the proxy, to enable said officers to amend the articles of incorporation and increase the capital as they might determine advantageous. Having previously completed arrangements with the Michigan Bell officials to sell the control of the capital stock to them, as stated, the New State officials amended the company's articles and increased the capital $700,000, which, with their private holdings of stock, was promptly transferred to the Michigan Bell company. Then the minority stockholders in said company were forced to accept Michigan Telephone Company stock in exchange for their holdings, thus securing the property of said company to the Michigan Bell, which property included the purchase money in the New State treasury, which had been realized from the sale of the $700,000 of stock above mentioned. Thus through the New State officials were the stockholders of the New State company betrayed into exchanging their holdings for worthless stock, and in the recent sale of the Michigan properties these stockholders have been entirely cut off without any compensation. In addition to the above the Michigan Telephone Company used the proceeds from the sale of its bonds to increase the number of telephones in service and at rates that, in very many instances, were much less than the actual cost of operation. By this method the total number of telephones was increased from 20,000 in 1899 to about 49,000 in 1902. In connection with the purchase of the companies above mentioned by the Michigan Bell, said Michigan company assumed and guaranteed a mortgage of $594,000 upon the property of the Detroit Telephone Company. Thus at the time of the foreclosure sale of the Michigan telephone property in December last there was outstanding the $5,000,000 mortgage upon its property and the $594,000 which it had guaranteed. While the reorganization plan as announced makes no mention of this latter mortgage, it had been previously given out through the Detroit newspapers that bondholders of this latter mortgage would be included in the reorganization scheme of settlement, although on a less favorable basis than were the bondholders of the Michigan Bell company mortgage.

If both mortgages are included, as suggested, then the 5 per cent bonds outstanding against the Michigan Bell property at the time of sale was $5,594,000. The new organization is to have an immediate issue of 5 per cent bonds and 6 per cent preferred stock, aggregating $6,751,000, as above mentioned.

The question naturally arises whether the new company can pay interest on $1,166,000 more interest-bearing securities than the old company had, upon the same property. In case the Detroit company bonds are not included in the figures given out by the reorganization committee, then the increased amount of interest-bearing securities over those of the old company would be $1,760,000, the interest of which increase would annually exceed an average income of $2.00 per telephone on every Bell telephone now in the state.

The old company failed because it could not pay its interest on the $5,000,000 mortgage, and defaulted the same on July 1, 1902, and January 1, 1903. The receiver was appointed in February, 1903—twenty years after the original incorporation of the company. During the first twelve years of its existence it had no competition. For the past five years competition has been very active and successful. The Independent companies have developed practically all of the state occupied by the old Bell company, except that included in a thirty-mile strip along the east side of the state on the lakes and the Detroit river.

In lower Michigan the Independents, other than in the territory excepted, have more telephones and a better service than have the Bell interests. In no instance has the Bell company driven out an Independent company, and in no case has an Independent company failed. The Independent companies in this state have no bonds on any of their properties, with two exceptions, save where the entire proceeds of such bonds were used in construction. In other words, with the exception indicated, the entire bonds and stocks issued by Independents in Michigan does not exceed the actual cost in cash for the labor, material and apparatus used in the construction of their plants. There is no water in the capitalization of the Independent companies.

The result is that with unincumbered property the companies owning and operating considerably over half of all of the Independent telephones in the state have paid regularly for five years or more eight per cent cash dividends. The Independent companies have had regular growth and are to-day operating nearly 50,000 telephones in the state, being about the same number as the total Bell telephones in service.

Thus to-day the conditions existing in the telephone field as between the two interests show a strange contrast. The Independents have unincumbered property; better construction of exchanges in the large majority of cities and towns occupied by both interests; are furnishing the public with satisfactory exchange service; have a more complete system of state or toll lines in lower Michigan than has the Bell interest; are as a rule operating under franchises having maximum regulation of rates, which are about 60 per cent of those charged by the Bell company before competition; have a successful record up to date; have confidence in their ability to compete with any Bell opposition.

On the other hand, the Bell interests in the state have their property encumbered with bonds and preferred stock for a much larger amount than the corresponding Independent properties have cost. In addition they have a very large amount of common stock; also much of the exchange construction is old and badly in need of rebuilding; as a rule the Bell service furnished is not satisfactory to the public, nor has it been in its state line service, and rates are not satisfactory. In a majority of the localities it has no franchises regulating rates; where competition exists Bell rates are, as a rule, lower than those of the competing companies. In cities and towns having no competition that are occupied by the Bell the rates are very much higher than are either Bell or Independent rates in other cities and towns of the same size having competition; with a record of failure and mismanagement in the past and with sympathies of the people of Michigan opposed to Bell interests. Further, the parent Bell company (American Telephone and Telegraph Company) owns the long distance lines connecting Chicago, Kalamazoo and Detroit and intermediate exchanges also connecting Kalamazoo and Grand Rapids; also, connecting Toledo with Detroit, Saginaw and intermediate cities. Thus a large amount of its long distance business belongs not to the Michigan State Telephone Company, but to the parent Bell company.

In addition to the above conditions the fact that the Independent companies pay no royalties, while all Bell companies are compelled so to do, has a very important factor. The Independent companies will never have to pay royalties, while Bell companies must always pay them if the American Telephone and Telegraph Company continues to exist.

It is noticeable in the reorganization plan that not only is a large amount of common stock issued, sufficient in fact to control the company, but it is pooled, as innocently stated by the committee, "thus securing permanency and harmony."

While the minority stockholders of the old Bell company receive absolutely nothing for their holdings, they see the new organization permanently controlled by a stock having no real value to-day and probably costing its holders little or nothing.

Of the $5,000,000 of stock of the old Michigan Telephone Company the parent Bell company (the American Telephone and Telegraph Company) owned $3,687,300, and the remainder of the stock, $1,312,900, was owned by 743 minority stockholders. Many of these stockholders feel that the parent Bell interests are being cared for in the reorganization plan, for otherwise why should the American Bell Company be willing to lose its $3,687,300 of stock and over two and one-half millions of indebtedness owing it, or companies controlled by it, by the Michigan company, provided the property had the value which the reorganization committee places upon it. If this supposition on the part of the minority stockholders is not correct, then the conclusion must be reached by the public that the reorganization committee has greatly overcapitalized the property of the Michigan company.

The personnel of the new company is of interest, especially to those who may become holders of any of the securities or stock of the Michigan State Telephone Company. In the old days when the Michigan Bell company was first organized, and for many years thereafter, the Hon. James McMillan was its president, and with his partner, J. S. Newberry, comprised two of the largest stockholders of the company. Another large stockholder was W. L. Jackson, for years the general manager of the Michigan Telephone Company. In the new organization the sons of the first two gentlemen are prominent, being W. C. McMillan and T. H. Newberry; and W. L. Jackson is again to assume the active management of this telephone property. It is also of interest to note that Dudley E. Waters, Grand Rapids, who was a director of the Michigan Telephone Company, is also a director of the Michigan State Telephone Company; that James Land, former general superintendent of the Michigan Bell, is now general manager of the reorganized company; that W. J. Berry, a district superintendent of the old Bell company, is general superintendent of the new organization; that Chas. L. Boyce, former superintendent of equipment, is now electrical engineer. Thus the reorganization seems to be one as to stockholders only—probably not as to management or policy, judging from the fact that the officers and employes have for years been active Bell men.

It remains to be seen whether the Michigan State Telephone Company, overburdened at the very beginning in its capitalization and with many obstacles as heretofore indicated, will be able to successfully conduct the business to an extent that it may pay its interests on the bonds and preferred stock from its earnings, even temporarily.

The people of Michigan believe the success of the new company impossible. The Independent companies have apparently no fear whatever as to the competition of the new organization. Time alone will demonstrate whether the people of the state and the Independent companies are the best judges of conditions which make success in the telephone field, or whether the Bell companies and its reorganization committee are the best judges.

THE TELEPHONE EAR.

"Did you know this telephone business has resulted in a telephone ear?" said a clerk whose work called him constantly to the telephone. "I don't mean that our hearing is injured, but that the left ear becomes more keen than the right.

"If you'll notice, all the telephones are left-handed. That is, the instruments are so placed that we hold the receiver with the left hand, so that we may have the right hand free to use in taking notes of messages, I presume. Of course, one naturally claps the receiver to his left ear, as it would be almost impossible to twist it around to his right ear. Consequently the left ear gradually becomes much sharper in catching sounds than the right ear.

"If you don't believe it, just try holding the receiver in your right hand some time and use your right ear. You'll find that conversation which was perfectly distinct to the left ear sounds confused and muffled to the right, and there is a distinct effort to understand. It is simply that the left ear is a trained telephone ear, while the right ear is not."—*New York Tribune.*

Securities of the Cuyahoga and United States Telephone companies will probably be listed on the Cleveland stock exchange within a short time.

Telephony.

AN ILLUSTRATED MONTHLY TELEPHONE JOURNAL

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Change in advertisements intended for a particular issue should reach the Chicago office of TELEPHONY by the 20th of the month preceding publication. New advertisements can be received up to the 25th of the month.

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CHICAGO, APRIL, 1904.

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DIRECTORY FOR OPERATING TELEPHONE COMPANIES.

There is not an Independent telephone company in the United States that has not been asked by the publishers of TELEPHONY to furnish certain information that would contribute towards the compilation of a directory of Independent operating telephone companies. A very great many of these companies have been generous enough to comply with the request, while others have regarded the matter of not sufficient importance to respond. The desire on the part of TELEPHONY to publish this contemplated directory is an unselfish one. We believe that such a record will revert to the best interests of the Independent telephone movement. The development of the business has been so rapid that it has been almost impossible to keep pace with it. Discussions in our conventions; the information already recorded; the keen interest displayed on the part of investors; the enormous amount of capital already invested; the tremendous possibilities yet in store for us, and many other important manifestations point strongly to the need of some definite statistics that will lend further impetus to the movement. Realizing that time is a valuable factor in the life of the busy exchange manager, and that the local telephone directory contains much of the information that will assist in this work, we will respectfully urge the importance of sending these directories to us. Whether they are pretentious catalogues, pamphlets, folders or cards, they will supply some information that will assist us in our efforts. Any other information will be gladly received, but at all events, let us have your directory without delay.

In Iowa, a state law requires the telephone companies to make report to the secretary of state annually. By virtue of this law, the information becomes a matter of record, which in all probability explains why the telephone business in that state has had such phenomenal development. Help us to compile a directory for the United States. Your telephone directory will help us do this, and we will appreciate your courtesy in sending it.

The Independent telephone is the result of an urgent public demand for telephone competition.

TELEPHONY'S ADVERTISING RATES.

In the March TELEPHONY the publishers made the announcement that they would pay $1,000 to any one who would prove that there was any advertising in that number that was being paid for at a less rate than $50 for a page; $27 for a half page; $16 for a quarter page; $9 for an eighth page, or $5 for a sixteenth page. It would have been most silly to have offered such an amount without a full knowledge of our advertising contracts. The offer was made to set at rest any question that TELEPHONY might be playing favorites, granting one advertiser a better rate than another—a practice that is manifestly unfair and which we have abundance of proof is being practiced by some of our contemporaries.

The reward has stood for one month, during which time no effort has been made to secure the money. But our proposition has been attacked in a cowardly and vicious manner, involving a method that is mean and contemptible. We have received an alleged fac-simile advertising contract, accompanied by the following anonymous letter, which is being sent to TELEPHONY'S advertisers:

Read editorial in March TELEPHONY on advertising rates and note rate and space on enclosed copy of contract. This is the reproduction of a contract given to a prospective advertiser by Elmer E. Smith, advertising manager of TELEPHONY, and is in his handwriting. It gives a half page at quarter page rate.

The significance of the final sentence is lost in the face of the offer made in March. The alleged contract gives

nothing. It assumes to give nothing. It bears no signature. We will give the sender of this nefarious letter one thousand dollars if he can prove that an advertiser can buy space in TELEPHONY at a price less than our established rates. We recognize no agents but our own; we resort to no rebating methods, commonly practiced. To fasten the lie, to defeat this weak attempt to disturb relations existing between TELEPHONY and its advertisers, we will pay an additional thousand dollars if, since the establishment of our present rates, it can be proved that a half page advertisement has been accepted by the publishers at the price of one-fourth page. This offer, like the one made in March, is made with complete knowledge of our position. The advertiser who cares to may investigate our advertising records, inspect our contracts and examine our ledger to satisfy himself that our rates are absolutely uniform.

The prospective advertiser who is supposed to have received the alleged concession from our advertising representative is invited to make this investigation. He will appreciate that if his belief is with foundation in fact that a reward of two thousand dollars will be paid. We believe this ought to settle the matter. The underhanded methods that are being employed against this publication have a tendency to strengthen our position. Among the many valued patrons that are numbered in the pages of TELEPHONY but four have given the anonymous letter a second thought.

TELEPHONY aims to be fearless, truthful and independent. It has but one rate for advertising, one rate for subscription. The publication stands on its merit as the leading telephone publication of the world. Its strength with subscriber and advertiser leads to these petty attacks, which are of little consequence.

The general public has given a greater, more substantial and more enthusiastic support to the Independent telephone movement than to any other line of business in the history of the country.

TELELOGUE.

To get a perfectly derived word to cover a conversation held over the telephone is rather a difficult task. Yet such a word is bound to come into use sooner or later. It is a waste of time and material for a business man in dictating a letter to say, "referring to our conversation held over the telephone." There should be a word evolved to cover this. "Telelogue" has been suggested, which means "a word from afar." While the word seems to cover the point, it is not very uphonious. Who will discover or evolve the right word?

The Independent movement is a rebuke to twenty-five years of Bell telephone monopoly.

THE POSITION OF INDEPENDENTS.

The position occupied by the Independent telephone exchanges has changed very materially during the past year. The excellent service, both local and long distance, has won high praise from the telephone user, and this same good service has so extended the systems that the operating companies have been almost unable to keep up with improvements and extensions. Investors have been quick to see the profit in Independent telephone securities. The stability of the properties has appealed to them, and they are looking for Independent telephone investments. Some investors heretofore have been buying Bell securities, but the changes in the position of the Bell and Independents has led them to dispose of Bell holdings and invest in Independent stocks and bonds. A shrinkage of 7,442 instruments gross and 9,347 net is the story told by the instrument output statement of the American Telephone and Telegraph Company for the month of February. The gross output figures were 84,402, as against 91,844 a year ago and 95,584 in 1902; net output 47,309, as against 56,656 last year and 58,729 in 1902.

Surely these monthly output statements, in which a steady Bell loss is shown, are not likely to strengthen Bell securities.

In the history of all inventions there has been nothing which has so quickly and so thoroughly intrenched itself in public favor as the telephone.

COURT DECIDES KELLOGG IS BELL.

On March 4, 1904, Judge Mack in the Cook county circuit court handed down a decision sustaining the Bell demurrer to the suit brought by the minority stockholders of the Kellogg Switchboard and Supply Company. The suit was instituted by the minority sotckholders to set aside the sale of the controlling stock in the Kellogg company to Bell interests. The decision gives the Bell control of the Kellogg company, but the victory is a hollow one, as the Kellogg business in the Independent field now amounts to very little, and the only use the Bell will find for this factory will be as an addition to its own manufacturing plant. A few Independent telephone men have been buying Kellogg apparatus, even after the exposure of its true condition was made. They were hopeful that the sale to the Bell might be set aside, but now that a decision in the case has been rendered unfavorable to the Kellogg company, no self-respecting Independent will purchase Kellogg apparatus at any price or under any condition.

The decision is quite a lengthy one and gives no hope to the minority stockholders. Judge Mack says:

"A minority stockholder of a corporation complains that the ownership of more than two-thirds of the stock standing on the books of the company in the names of certain individuals was acquired and is held by them in trust for a foreign corporation, which brought about the transaction for certain purposes alleged to be illegal, and that if certain things shall in the future be done by the board of directors, whose election is controlled by the foreign corporation, or by the two-thirds stockholders controlled by it, injury will result to the stockholders.

"1. What remedy has the minority stockholder under such a bill?

"2. Are the allegations of the bill sufficient to give the possible remedy?

"Except as they support the allegations of injury to the property rights of the complainant or of the illegal purpose of the defendant, the American Telephone and Telegraph Company, all of the charges in reference to the so-called Independent companies are immaterial. The stockholder has no standing to protect outsiders or to represent the general public as such. Neither can he interfere in the transactions between the purchaser and the seller, because of any wrong to the seller.

"I know of no case in which it is held that the legal title owned by one and intended by him to pass to a vendee and intended by the vendee to be acquired, will be deemed not to have passed because of some illegal use intended to be made of the property by the vendee and that, too, irrespective of the knowledge and assent of the vendor for this purpose. The legal ownership, therefore, of the stock is complete."

"As to the cross bill, either Kellogg has by ratification or failure to disaffirm promptly on acquiring notice of the transaction, become a participant in the alleged illegal sale, or he is an innocent vendor. A defrauded vendor, if innocent, can disaffirm and rescind the transaction, and on a tender-back of the purchase money can recover his property. (As the United States Supreme Court says in Shappiro vs. Goldberg, decided January, 1904.)

"Where a party desires to rescind upon the ground of fraud, he must upon discovery of the fraud announce his purpose and adhere to it." If the rights of a vendor not defrauded, but selling for an illegal use, were the same, Kellogg's right to rescind would be at an end because he did not act promptly on learning the facts, but, on the contrary, treated the money as his own and the stock as the vendee's. But, even if he had acted promptly, would he have the right similar to those of a defrauded vendor? The agent had full power to make this sale. He was expressly authorized to do all that Kellogg could have done and that he was acting in his

interest is conceded. Even if the purchase was for an illegal purpose to the knowledge of the agent, the legal title passed through, the principal might not be changed criminally as a wrong doer. Kellogg can at best claim the position of an innocent vendor. But, as hereinabove stated, I know of no case permitting an innocent vendor to set aside an executed sale because of the illegal purpose to which the vendee intends to devote the thing bought.

"It becomes necessary to consider the other objections to the cross bill. Kellogg can in no event have the stock restored to him. So far, therefore, as his bill seeks this relief, it cannot be maintained. So far as it seeks any relief, a cross bill cannot be brought as the other relief is identical with that sought in the original bill which is brought in behalf of all stockholders, and may be obtained in the original proceedings. It becomes, therefore, unnecessary to consider the other objections to the cross bill."

The court holds that Mr. Kellogg's agent had full power to make the sale; that Mr. Kellogg can in no event have the stock returned to him, and that the legal ownership of the controlling stock by Bell interests is complete.

TELEPHONY has held all along that the sale would stand. That the Kellogg was Bell. Now all doubt has been removed and the Kellogg factory must hereafter be referred to as a Bell factory, and will not be patronized by Independents.

The telephone is one of the great institutions and conveniences of modern life. We use it, we cuss it, we complain, we grumble, but after all, how could we get along without it?

AGAINST MONOPOLY.

There will be introduced in the legislature, if the plans of those who are now giving consideration to the subject are unchanged, a measure that will attract attention throughout the whole country, one that it is believed will be accepted as a signal for one of the most important general movements against restraint of the use of facilities for commerce that has ever been started. The bill has not yet been framed, but the thing sought has been given much consideration by members of the legislature, and in the discussions it has been determined just about what is desired. The thought is simple. It is that the state of Iowa shall require an exchange of business between telegraph and telephone lines and systems within the state, and forbid the formation of any combination or agreement that will prevent this interchange of business over the wires of companies obtaining their rights from the public. No attempt will be made to require any exchange of business outside the state for long-distance business.

It will require not merely that business shall be exchanged, but that there shall be an actual exchange of operation, or that telegraph companies shall be compelled to allow long-distance telephone companies to attach telephones direct to their wires used for telegraphing, and vice versa. The bill will probably go also to the length of forbidding any company having a public charter in the state of Iowa from continuing to do business under any contract or agreement which divides the business or territory or the character of the service, etc.

The attention of the members of the legislature has been called to the fact that back twenty-five years ago, when it was discovered that the telephones could be used for long distance, and the big telephone monopoly was established, there was danger threatened to the business of the telegraph company, and for a long time it looked like there would be war, but that a contract was signed by the Bell telephone people and the Western Union Telegraph Company, under which each one agreed to keep out of the territory of the other. Several million dollars was paid by the telephone company to the telegraph company under this agreement, and then after payments had ceased for a number of years suit was brought to recover many millions more under the contract. It was when this suit was tried that the fact of the existing contract was brought to public notice. Now the claim is made that by reason of the contract in restraint of trade and contrary to public policy, there is no exchange of business between telephone and telegraph companies at this time, and rates for telegraph service are held unreasonably high. But for this contract it would be impossible to engage in telephoning over all wires in the country. It is pointed out that if the state forbids this agreement for a division monopoly, then telephone lines will be connected up with long-distance wires and the rural and farmer telephones and the mutuals and all others will be in a position to exchange with the telegraph companies, and practically every local line in the state will become a long-distance line.

The claim is also made that telegraphing and telephoning can be done over the same wires at the same time without interference; or, in other words, that the connecting of the wires with telephones will not injure their usefulness for telegraphing at the same time.

While the bill is intended to affect only the business done in Iowa, and no law can be made that will cause any change in the interstate business, yet it is contended that in case Iowa establishes this policy, other states will follow. In behalf of the measure it will be urged also that under this system telephoning will become so cheap that newspaper messages and information will be transmitted by telephone instead of by telegraph, and the publishing of newspapers will be cheapened, or the amount of news available to the public will become that much larger.

When a telephone is installed in every home, every office and every place of business its mission of usefulness will have been fulfilled.

PRINTED COPIES OF PATENTS.

Probably the most important bureau of our government from the standpoint of the modern industrialist is the patent office and certainly it is the most neglected by its beneficiaries. We shall take occasion in a later issue to expatiate somewhat on the improvements that are needed in both the machinery and the personnel of this office, which ought to lead the van of progress in matters of organization and equipment, but does not. At present we wish to refer to a specific matter which directly affects the interests of every manufacturer, every telephone operator and, in fact, of every one who carries on business involving or affected by patents.

For some time past the price paid for printed copies of patents has been five cents each. It is now proposed by the commissioner of patents, and he is asking congress, to make a sliding scale, the price not to exceed ten cents for each five pages. This purpose of the commissioner of patents must be defeated. Apart from the amount of money involved, which is considerable, delays are threatened of the most mischievous kind, for when a person orders a copy of a patent he usually needs it at once, and cannot wait for a correspondence back and forth to give him an estimate of the price and enable him to remit the same.

There has always been something just a little mysterious about the copy accounts of the commissioner of patents, and his present statement that there is a deficit because the price is too low we trust will not be accepted by the members of the patent committees of house and senate. They should call upon him imperatively for a specific statement showing why there is a deficit and why he wants to raise the price. Every manufacturer and every telephone man who is interested in patents should warn his member of congress at this juncture to object to the proposed amendment to the statutes.

During the fiscal year ending July 1, 1903, there were sold from the patent office 1,827,937 copies of patents. At

the stated price of five cents each these would have brought the government $91,396.85, but it appears that about 400,000 of these copies were used for free distribution, exchange with foreign governments, for public libraries, etc. Is this $20,000 to be charged up against the patentees of this country? As well might a grocer charge his family consumption against the cost of goods sold.

The absurdity of increasing the price of anything furnished by the patent office appears from another consideration—viz., that in the treasury of the United States there is at present a *patent office surplus* of nearly $6,000,000, and the net profit last year was $193,000. Now in public business public convenience is properly regarded as of greater importance than absolute uniformity in pay for service rendered. This is particularly well illustrated in the postal service. Thus, it costs two cents an ounce to carry a letter from one point to another in the same city. And it costs just the same to carry the same letter from New York to Boston, to San Francisco or to the Philippines. It costs one cent for each two ounces for printed matter as against two cents for one ounce of written matter, and as against one cent for one ounce of merchandise, while newspapers go for one cent for each four ounces. Public convenience is deemed to justify this. Public convenience certainly justifies a uniform rate for printed copies of patents.

There have been 753,833 patents issued in this country. Of these not over 100 exceed twenty pages in size. Not over 100,000 have five pages. From 600 to 650,000 have only two or three pages. Inasmuch as plates have to be made anyhow for printing the originals, the cost of copies is practically only that of the ink and paper. This should not exceed one cent a page, and there is no excuse for either limiting the editions to seventy-five copies, as at present, or for raising the price per copy.

This matter should be called to the attention of every congressman without delay.

The telephone transmits in miniature the infinitisemal overtones which indicate the character of sounds, the individual quality of a voice or the source of a tone, through the whole range of vibrations far beyond the limits of the human ear.

ADVANTAGES OF A TECHNICAL EDUCATION.

When George A. Damon presented his paper before the first meeting of the electrical section of the Western Society of Engineers, he disguised it under the luring title "Opportunities in the Electrical Business." The skillful observations of the author, together with the accumulation of data that he had collected in anticipation of his subject, made his paper most valuable. If all meetings of the electrical section of the society prove as interesting as the initial one, the success of the new departure is assured.

Whatever else may be said of Mr. Damon's paper, it developed that the advantages of a technical education were never so thoroughly appreciated as now. The discussion following the reading was an emphatic endorsement, and nearly every thought was presented that might have been brought to bear on the subject.

It is generally understood that the manufacturer and business man prefers technically trained young men, provided their theories are in harmony with their practice. It was because of the conversation with an ambitious young man that Mr. Damon selected his topic. Said this young man:

"I am a Senior in the high school and I want to become an electrical engineer. What shall I do?

"Some men tell me to take a college course first and enter practical work afterward; some tell me to get a few years' experience first and then take a college course, while still others tell me to study several years, work a year or two and then finish my Senior year. In planning my course should I include the language studies or cut them out in favor of shop, laboratory or commercial courses? Should I try to get through in three years, or should I extend my college education over a period of five years? Others tell me to leave out the university work entirely, go to work in the shop or upon construction work, getting what theoretical training I require by attendance at night school or by taking a correspondence course. What shall I do?"

Similar questions have been asked before, and answered after a fashion, but with an engineer's intuition, Mr. Damon submitted a circular letter to one hundred of the leading men engaged in the electrical industry in Chicago, asking that they furnish responses to the following questions:

1—Is a college education essential to the highest success?

2—Does a technical graduate consult his best interests by accepting a position as "special apprentice," or work in the "testing department" of a large manufacturing company?

3—Does employment with the larger companies offer the same opportunities for advancement as work with comparatively smaller organizations?

4—Would it not be a good rule to require a year's practical experience before completion of the college course?

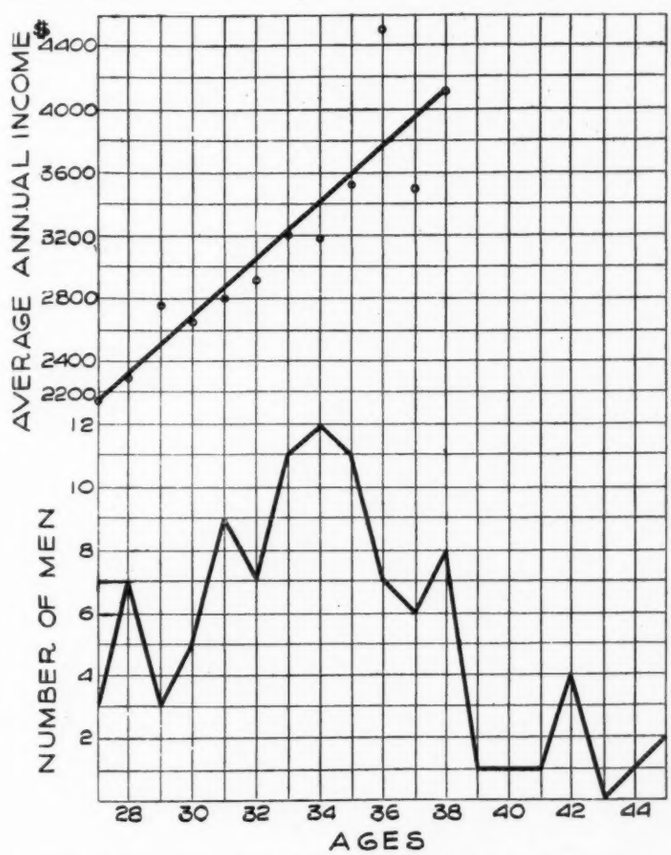
5—Would not the larger companies consult their own interests and the interest of the art at large by offering an apprentice course open to college students between their Junior and Senior years?

6—In the light of our present experience, and under existing conditions, what course would you follow if you had it all to do over again?

Invitation was also extended in the letter for an expression of opinion that might be pertinent to the subject. Remarkable as it may seem, one hundred answers were received, and Mr. Damon offers the following analysis of results:

Young men control the business. The inquiry was, therefore, confined to men between the ages of 27 and 45, upon the theory that the older men are the product of a set of conditions which have passed away, while the youngest men are, as a rule, still engaged in a period of preparation. The number of men of each age is shown graphically. The average age is thirty-three and one-half years.

The average income at each age is also plotted on a gunshot diagram and a line of average incomes determined up to the age



of thirty-eight, after which there was not sufficient data to locate the curve. This income curve starts with a value of $2,170 at twenty-seven and extends to $4,000 at the age of thirty-eight. The average income of the entire one hundred men is $3,440 per year, which will give us a standard by which we can measure the different branches from a mercenary standpoint.

The hundred men may be divided into groups as follows:

	No. of men	Average Age	Average Income
Salesmen	7	33	$2,400
Sales Managers	11	36	3,400
Business Men	10	36	4,800
Sales Engineers	8	35	2,350
Electrical Engineers	16	33	2,800
Constructing Engineers	6	33	2,850
Electrical Experts	8	33	3,200
Operating Engineers	3	32	2,250
Operating Managers and Superintendents	10	34	3,550
Professors and Editors	8	34	2,500
Patent Attorneys	4	32	4,000
Consulting Engineers	9	40	6,400

Total number of men, 100. General Averages: age, 33½ years; income, $3,440.

Classified in reference to incomes, the record is as follows:

	Men
Income over $10,000 per year	5
Income between $5,000 and $10,000	9
Income between $2,400 and $5,000	66
Income below $2,400	20
Total	100

Thirty-five per cent of the men either control the business in which they are engaged or own a partnership interest.

Twenty-five per cent of the men are not college graduates

Twenty per cent of this hundred successful men never had any college education whatever.

The average age of the twenty men who are succeeding without a college education is thirty-six years, and their success measured by a monetary standard shows an income of $3,670 per year.

The average age of sixteen graduates of Cornell is also thirty-six years, and their success measured by the same questionable standard is $4,940, which shows a balance of $1,270 per year in favor of a college education.

It will be noted, however, that the twenty men without the education are getting along financially slightly better than the general average of $3,440 per year. This is explained by the fact that in their number are included several men who are prospering as a result of their business enterprise.

There are few non-technical men engaged in the strictly technical end of the business who reach the average income.

There seem to be more openings for the man without a college training in the telephone field than in any other.

The inquiry into the domestic arrangements of our hundred examples shows that seventy-five per cent of them are married. The families are composed of forty-five boys and thirty girls.

The answers to the questions upon which an expression of opinion was asked resulted as follows:

Eighty per cent are inclined to think that a college education is essential to the highest success.

Seventy per cent are in favor of the technical graduate taking a shop course in a large manufacturing company, but many wished to limit this course to one year.

Fifty-five per cent are of the opinion that in choosing a life work better chances for advancement will be found with the smaller companies.

Seventy per cent are in favor of requiring a year's practical work of the student before graduation.

Fifty-five per cent agree that the larger companies would be consulting the interest of the art at large by offering an apprentice course open to students during an intermission of one or two years before completing the senior year.

In this analysis it will be observed that there seems to be more openings for the man without the college education in the telephone field than in any other. Another interesting point was developed in the answers designating choice of opportunities in the three electrical fields. The votes received are as follows:

Electric Railway Work	63
Telephony	36
Transmission	30
Electro-Chemistry	29
Power Applications	21
Lighting Developments	12
Manufacturing	11
Central Station Work	9
Patent Law	6
Consulting Engineering	6
Contracting	5
Management of Properties	5
Storage Batteries	4
Reconstruction of Plants	3
Mining	3
Metallurgy	3
Turbines	2
Wireless Telegraphy, Designing, High Speed Telegraphy, Underground Conduit Construction, Isolated Plants, Train Lighting and Municipal Lighting, each	1

It is most gratifying to observe that telephony ranks second in this list. The judgment of one hundred leading men in the electrical industry ought to be of considerable weight to the young man who has cast his lot in the telephone industry. We feel confident that it is but a matter of short time until telephony will rank first in this vast industry.

The discussion following the paper was participated in by Prof. P. B. Woodworth of Lewis Institute of Technology, who believed that it was unadvisable to leave the college course to take a year of practical work before graduation. He thought that the spirit of the school work would be lost during the year of practical work, or the shop course, and that the student would not be able to resume his studies at school with the same interest that was first displayed. Prof. C. E. Freeman, of Armour Institute, concurred in the opinion of Prof. Woodworth.

F. R. McBertie entered at length into the discussion, and his deductions were so pertinent and were confined so closely to the telephone end of the business that we are presenting them practically as he gave them.

Probably the most interesting fact brought out in the paper is the large percentage of men without college training who would be regarded as successful. I wish to suggest an explanation of the fact and a deduction from it.

The development of the telephone business covers a period of about twenty-five years. Throughout the greater part of the period the requirements for telephone service have not been formulated and little data has been available from which to generalize. It was necessary to develop apparatus fitted to the needs of the service, and the business was sufficiently profitable to permit frequent changes of apparatus and to require no very high degree of economy in operation. The condition was one which called for imagination, good judgment, shrewd guessing and familiarity with actual conditions. The inventor has occupied a very important place in the art as it developed. A survey of the engineers now occupying the most important places in the telephone business shows from the total number of sixteen, ten who have had no college training; of eight of these men, who are over forty years of age, two only, and of the remaining eight, four had college training. I count thirty-four inventors whose work has contributed to the greatest extent to the advance of the telephonic art during the period of development. I lack information as to the preliminary training of eight of this number; of the remaining twenty-six, twenty-two were without college training, while four were graduates of colleges. The aggregate number of inventions patented to the thirty-four inventors is thirteen hundred and fifteen; of this number ten hundred and fifty-three were contributed by the twenty-two men without college training, and one hundred and sixty-seven were contributed by college men. It would thus seem that the college-trained inventors were not only greatly outnumbered by the others, but also were less prolific. In my opinion this record of patents may safely be taken as an index of the practical and valuable achievements of the different inventors.

In the electrical business, particularly in telephony, every important advance in the construction of apparatus is represented by a patent. An examination of the patented inventions under consideration shows that the quality of inventions is by no means in inverse proportions to the quantity, but that a fair estimate of the importance of their inventions and the importance of their personal achievements would produce substantially the same alinement of the twenty-six inventors with respect to the matter of college training.

The indications of these statistics are supported by present observation. Selecting from about twenty of the younger telephone engineers those who are conspicuous for inventive ability, they are are found to be five in number, all but one of whom have had no college training. A cursory examination of the important inventions in the field of electric lighting and general electrical practice would seem to give about the same results; but I have not at hand the information to speak with any accuracy on this point.

The terms "technical" and "non-technical" under which Mr. Damon has classified engineers may mask the real situation. It must be apparent that these so-called non-technical engineers who are successful in the same field with the technical men possess practically equal technical knowledge, but that they have acquired this adequate knowledge and training through their own efforts. So far as my observation goes, these self-trained engineers began early, studied hard and worked hard; they developed the inventive imagination and the ability to guess shrewdly through contact with

actual conditions, and acquired good judgment through their own failures. They therefore were fitted to the conditions and they survived. They are receiving large incomes because their work has been valuable.

The electrical reactions and phenomena involved in telephony are more complicated than those involved in electric light and power work, while the forces involved are much feebler and more difficult of accurate measurement. The most refined mathematical expressions developed for power and lighting apparatus are only roughly approximate for conditions in telephony. During the period of the development of the telephone industry, light and power engineering has been reduced to a science, mathematical generalizations have been made available covering the greater part of the field of applied phenomena, and great quantities of exact data have been collected. By reason of the difficulty of providing such statements and such data in telephony, it still may be characterized as largely an art rather than a science; but it is approaching condition of a science, and it is probable that a few years hence not only the electrical phenomena, but such other matters as the best distribution of conductors, the probable distribution of stations, the probable effect of rates, etc., will obtain mathematical expression. Further, at the present time the available apparatus appears to be well suited to the requirements of telephone service so that radical invention is not essential, and profits have diminished so that the refinements of construction and operation must be looked to in the interests of economy. The field is thus a fertile one for the technical graduate, equipped with classified data and trained in mathematical analysis; and I look to see him occupy it as he has that of power and light engineering.

The inventing is by no means all done in the electrical industry, however. If, as would seem to be indicated by the facts about inventors which I have given, self-training tends to or college training prevents the development of the inventive imagination, the college course is not yet perfectly adapted in kind for the complete education of an engineer. It is a matter of statistics that inventive activity begins very early, before twenty. It may be that during the years spent in acquiring classified data and formulated methods in college other faculties of the mind are developed at the expense of inventive imagination; it may also be that the technical graduate having spent after graduation the years necessary to get in touch with the particular conditions of his practical work, is too old for radical invention. I believe the effect is due to both causes.

I therefore would suggest the query whether something should not be added to the college training to develop inventive ability in the engineer?

S. G. McMean was introduced as the optimist. He believed that the habit of industry is the first requisite to happiness and that labor is divine. In a very happy manner he portrayed that there is too microscopic an examination of the graduates' learning capacity and too little of the telescopic survey of what constitutes success thirty or forty years after graduation. Mr. McMean started into the telephone field about twenty years ago for the modest salary of $19 per month. He admitted that during this early period he paid $22 per month for board, making up the difference in overtime work for the pure joy of doing it. Today he ranks as one of the leading telephone engineers of the world.

Dr. F. A. C. Perrine of Pittsfield, Mass., of the Stanley Electric Manufacturing Company, believed with Prof. Woodworth and Prof. Freeman that the college course should not be interrupted. E. P. Warner advised permitting the boy to follow his natural bent and pointed out that it would be impossible to make an electrical expert of the youth who had an inclination towards art. Kempster B. Miller referred to the advantages of a thorough understanding of patents and suggested that where possible the student should acquire as much knowledge of the patent situation as his circumstances would permit.

Considerable time was devoted to the subject of correspondence schools as a means of developing the student who could not take advantage of a practical training. The conclusions of the discussion pointed clearly to the advantages of a technical education. That it is of the greatest importance goes without question, and that all men are striving for it for the knowledge it brings and the reward it offers is apparent everywhere, and particularly in the telephone field.

TELEPHONE COMPANY'S ANNUAL MEETING.

The annual meeting of the United States Telephone Company was held in the Electric building, Cleveland, February 29, and resulted in the election of the following directors: H. A. Everett, E. W. Moore, J. B. Hanna, C. W. Wason, B. Mahler, J. W. Marsh, James B. Hoge, F. S. Dickson, James R. Sprankle. Following are the officers appointed at the organization meeting: F. S. Dickson, president; E. W. Moore, vice-president; James B. Hoge, secretary; R. W. Judd, treasurer.

The only change in the board of directors was the substitution of James B. Hoge for Maxime Reber, who has resigned. E. W. Moore was made vice-president in place of Mr. Reber. The company has had a very prosperous year, as is shown by the treasurer's report printed below. The company expects to expend considerable money for new construction the coming year and expects its gross earnings to largely increase. The gross earnings last year show an increase of $76,838.85, while the expenses increased $59,963.27, the unusually heavy increase being due to the large expenditure for maintenance, which will not be necessary this year. Surplus for the year shows an increase of $14,470. Here is the financial statement for the year 1903, compared with 1902:

	1903.	1902.
Total assets	$4,685,048.22	$4,065,425.73
Total liabilities	4,669,076.04	4,086,564.05
Surplus	15,972.18	21,138.32
Total	$4,685,048.22	$4,065,425.73
Gross earnings	379,235.10	302,396.25
Expenses and taxes	239,278.45	179,315.18
Net earnings	139,956.65	123,081.07

A NEW COMPANY.

The Egg Harbor City Telephone Company, an Independent concern, was recently incorporated under the laws of New Jersey with an authorized capital of $10,000. The company received a franchise from the city of Egg Harbor, N. J., and has begun the construction of its lines. The new company will be the connecting link and will unite the Keystone State Telephone & Telegraph Company of Philadelphia, Pa., the Eastern Telephone Company of Camden, the Interstate Telephone Company of Trenton and the Atlantic Coast Telephone Company of Atlantic City, N. J. Through these exchanges, most every city, town and village in New Jersey can be reached. A long distance line is in course of construction between Philadelphia and Atlantic City, a distance of over sixty miles, with ten pair circuits number ten copper wire. This will be added to as soon as possible. The completion of the various lines will give the Independent companies connections with over 100,000 stations throughout New Jersey.

At Egg Harbor, the Bell company charged $35 for business telephone and $25 for party lines. It had over twenty-six instruments for a time, but now has only three. The Independent companies are giving better rates and service and are getting all the business. The Egg Harbor company will start with a list of fifty subscribers, which will reach 100 to 200 soon. The exchange of the Bell company was moved to three different locations in almost as many months, and no one seems to want to take charge of it. The officers of the Egg Harbor Telephone Company are: George W. Otto, president; Jacob Wimberg, vice-president; George F. Breder, secretary; Lorenz Krein, treasurer.

Please find inclosed $1.00 for renewal of my subscription to TELEPHONY, the greatest of all telephone publications and a great aid even for those having previous experience in the trade.—A. O. HEDBERG.

DIGEST OF TELEPHONE PATENTS

Conducted by Edward E. Clement

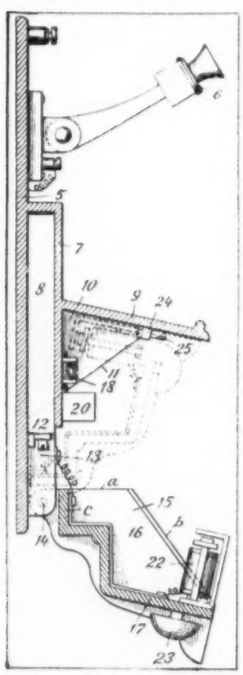
747,197. Telephone exchange. F. A. Lundquist.

This invention relates to automatic exchanges in which the calling subscriber himself selects the telephone calls, and has for its object improvements in the construction and arrangement shown in the Lundquist patent, 606,764, dated July 5, 1898. The main parts of the switches and telephone boxes in the present application are very similar to those described in the said patent, the differences lying principally in some modifications of parts, the addition of auxiliary switches and a new arrangement of the circuit.

747,331. Subscriber's telephone circuit. W. W. Dean.

The invention in this case is all shown in one small figure, but the attorney managed to get in 25 claims. This latest hatched of Mr. Dean's chicks (in the patent office) is a feathered hen on the outside. The scheme comprises a 25-ohm choke coil, through which direct current from central battery passes to the transmitter. In a shunt around the coil is the receiver, protected from direct current by the condenser. The ringer is bridged when the hook is down, from a point between the receiver and condenser, so as to include the latter in the bridge.

747,394.—Telephone wall set. E. B. Fahnestock.



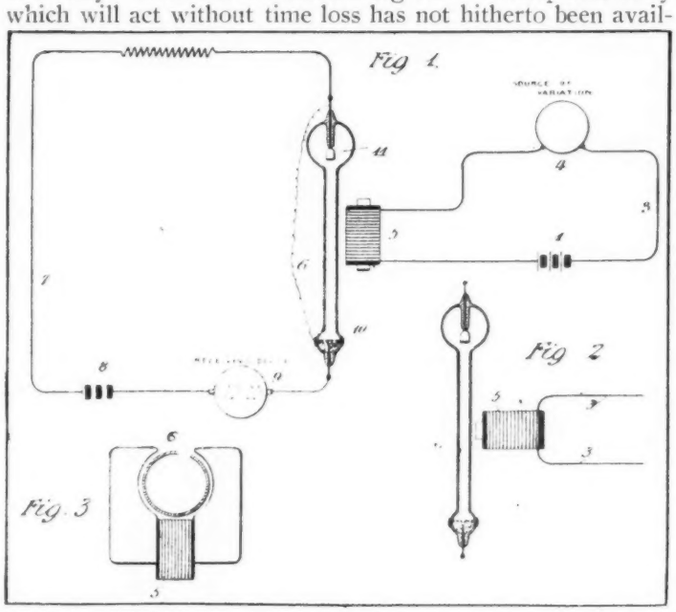
747,394.

The invention in this case relates particularly to the backboard, condenser box, and desk, of a common battery wall set. The figure is a vertical section. The backboard 5 carries the condenser box 7, which is open at the lower end 12 instead of at the upper end as usual. The desk 9 and side brackets 11 are permanently fixed on the backboard and condenser box. The lower or drop brackets, 16, and the front casing, 17, are made in a unit pivoted at 14 by short pins in downward extensions of the side brackets 11. The ringer is carried on this drop portion of the cabinet, the hook 18 and the coil 20 being fixed under the desk.

The drop portion is so designed that when down the condenser 8 may be withdrawn by simply dropping it out of the box, where it is retained in any suitable manner; but when the drop portion is turned up, as shown in dotted lines, the flange c closes in under the opening 12, and all the apparatus is securely enclosed.

749,791.—Means for reproducing electrical variations. P. C. Hewitt.

The mercury vapor lamp of Mr. Peter Cooper Hewitt seems to be a sort of a pooh-bah in the physical realm. It has figured not only as a source of light, but as a current interrupter and a rectifier, and now Mr. Hewitt announces in this patent and its twin that it may serve as a means for reproducing current variations in one circuit in accordance with those originally produced in another—in short, as a relay. The idea is a fascinating one. A telephone relay which will act without time loss has not hitherto been avail-



749,791—MEANS FOR REPRODUCING ELECTRICAL VARIATIONS.

able, although many minds have been addressed to the solution of the problem.

The circuit and apparatus shown in the patent are of the simplest and are shown in full herewith. Fig. 1 shows a transmitting circuit 3 containing a telephone transmitter 4, a battery 1, and a magnet 5. Changes in the magnet produce similar changes in the resistance of the vapor in the tube 6, and thereby affect the receiver 9. Figs. 2 and 3 show modifications in the arrangement of the magnet with respect to the tube. Mr. Hewitt says in his specification:

"It is possible by means of my invention to produce in the secondary or receiving circuit electrical variations of greater magnitude than the original electrical variations of the primary or transmitting circuit. This is due to the fact that a given magnetic variation may cause a wider fluctuation of effective resistance in the gas or vapor than the fluctuations of electrical energy producing the variation of the magnetic field of force. Accordingly by employing one of my lamps or vapor apparatuses, as described, I may magnify the vibrations of the circuit not by inductive effects, but by varying the ohmic resistance of the circuit in which the apparatus is included.

"I have mentioned a telephone-circuit merely for purposes of illustration. The amplifications due to changes in resistance of my apparatus may be applied to other circuits as well, including circuits carrying currents of large quantity.

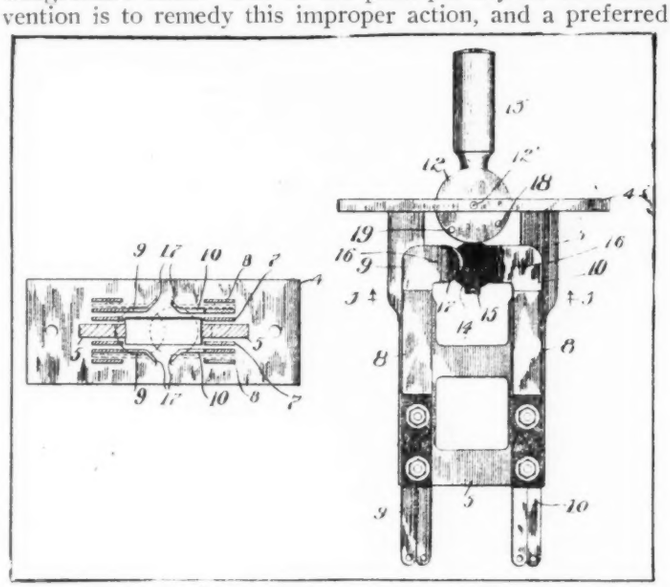
"It will further be understood that the applications of my invention are not limited to cases where it is desired to amplify the primary variations, but are useful also where it is merely desired to reproduce them in the same or even less magnitude."

Reference is made to previous patents issued to Mr. Hewitt Sept. 17, 1901, as to the means for starting the flow of current through the apparatus, and as to the broad scheme for regulating the resistance of the lamp.

750,845—Switching apparatus. J. S. Goldberg.

This is a ringing and listening key, and is assigned to the

Stromberg-Carlson Company. In almost all keys of this description the key will stay in the listening position, and must be restored by the operator. Such restoration is usually effected by a slight blow, the resilients of the spring serving to throw the key into normal position. Mr. Goldberg says that often when the lever has been thrown back in this way from listening to normal the spring will throw it over too far, so that it will reach the ringing side and momentarily open the cord contacts, thereby producing a disagreeable click. One of the principal objects of his invention is to remedy this improper action, and a preferred



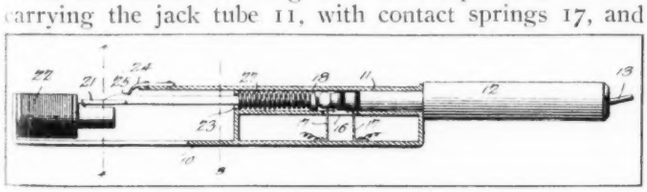
750,845—SWITCHING APPARATUS.

method is to make the contact springs on the listening side of lighter material or of less resilience than on the ringing side.

The figures herewith are a horizontal section and a side view, respectively, of a key. 9-9 are the long springs of the listening side, and 10-10 the corresponding springs of the ringing side. When the ball 14 is held between springs 9 to listen and is then restored by a blow, the idea is to prevent its rebound against springs 10 to push the latter apart. This is said to be caused by the inclined faces 17 pushing the ball as it passes from between them. Mr. Goldberg avoids this by making the springs 9 of a lighter grade of metal than the springs 10.

750,953—Plug ejecting jack for telephone switchboards. Robert G. Dunfee.

This is a jack that will throw out the plug automatically when the subscribers ring off. It comprises a frame 10 carrying the jack tube 11, with contact springs 17, and a

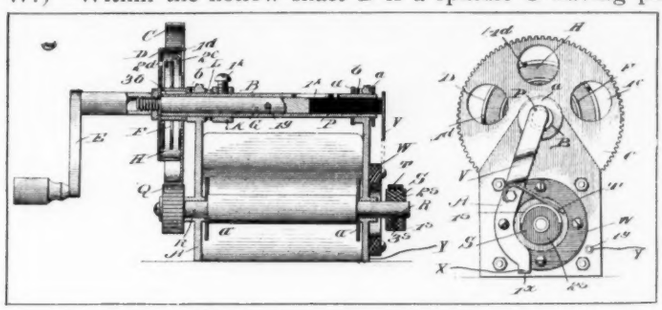


750,953—PLUG EJECTING JACK.

spring pressed plunger 18 normally out but pushed in by the plug so that it latches at 24-25. When the subscribers ring off magnet 22 is energized, pulls down armature 21 on the inner end of the plunger, and the spring 27 throws the same out, ejecting the plug as promptly and smoothly as a Bowery bouncer.

751,071—Signalling apparatus. E. L. Grauel.

This is a hand generator having a single commutator segment and its spring so arranged that uni-directional currents may be sent to line. The commutator is shown at S, the spring or brush at T being carried on a main spring V, which normally rests against the end of the hollow shaft B, thereby connecting with the frame and short circuiting the machine. (The spring V is insulated at A by the ring W.) Within the hollow shaft B is a spindle G having pin



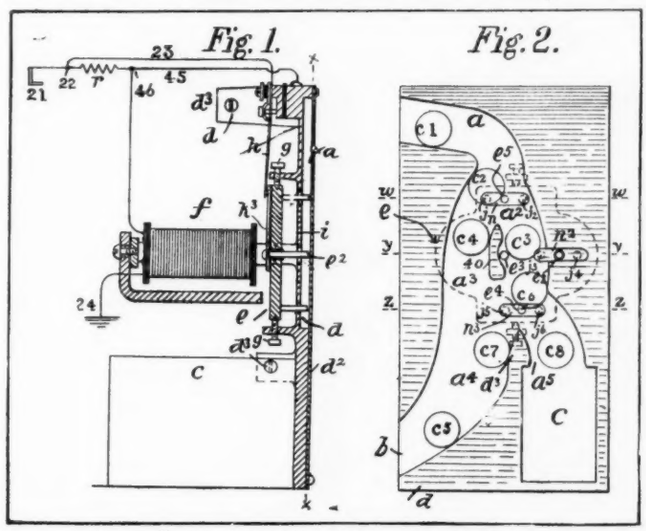
751,071—SIGNALLING APPARATUS.

lg working in an annular slot to permit rotation but no end play. The end of the spindle has a cam which acts to push out a plug of insulation P when the handle E is turned. This pushes the spring V away from the tube, and breaks the shunt.

751,081—Coin controlled telephone apparatus. S. J. Larnard.

This is an improvement in toll boxes shown in patents 665,874 to Bullard and 728,309 to Scribner. The deposit of a coin closes the signal circuit to central, the coin being arrested and thrown either into the cash box or into a return chute by a polarized magnet having its armature normally central but adapted to tilt one way or the other according to the direction of current sent from central. In the present case if the instrument or line is out of order the coin is returned immediately; but if the apparatus is all right it will be held and the regular operation proceeds. Three sets of deflecting pins on the armature are employed. Fig. 1 shows these in side view, and Fig. 2 looking at the face of the chute plate, which is a plate having the coin chute cut in it and covered with a sheet of metal.

The chute starts at a, widens out at a^3, with a midway fixed deflector 40, and has one branch a^4 leading to a re-



751,081—COIN CONTROLLED APPARATUS.

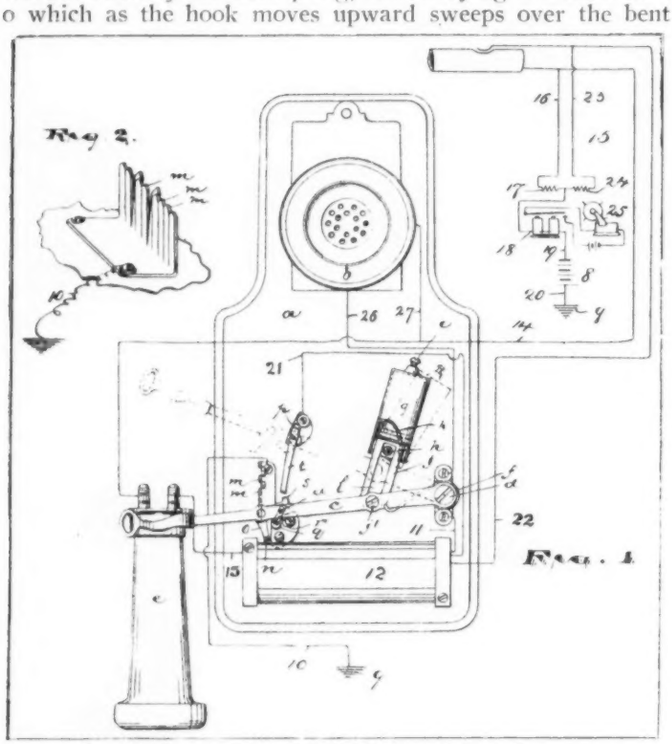
turn cup, and the other branch a^5 leading into the cash box. When the hook goes up to call the polarized magnet, which with its armature is shown in dotted lines in Fig. 2, is connected to ground outside of resistance r. which is of 3,000 ohms. If normal current is on the line the armature is tilted to the left as viewed in the figure, and

the three pins e^5, e^2, and e^4 are all thrown to the left into the positions shown in dotted lines at j, j^3, and j^5. A coin starting at c′ would pass down to the right of the first pin as shown at c^3 and there lodge between the pins e^3 and e^2. This closes a shunt about the resistance r and permits enough current to pass to light the line lamp at central. A reversal of current by the operator if she cannot get the desired connection, throws the pins over to the right into positions shown at j^2, j^4 and j^6. The coin c^3 rolls down to c^6, c^7, c^5, and out. On the other hand, if the connection is obtained the current is simply switched off and the coin falls at c^8 into the cash box.

With the pins standing normal in their middle positions, coins will fall down and out by the route c′, c^2, c^4, c^7, and c^5. This also happens if the hook is down.

751,103—Telephonic call instrument. J. D. Peachey.

This is a call register device, consisting of an ordinary relay and register set connected at central from both line wires to ground through suitable resistances 17 and 24, together with contacts on the switch-hook at the substation to make and break the circuit so as to record the number at central. The improvement lies in these make and break devices. In the figure c is the hook lever retarded in its upward motion by the dash pot g, and carrying a contact arm o which as the hook moves upward sweeps over the bent



751,103—TELEPHONE CALL INSTRUMENT.

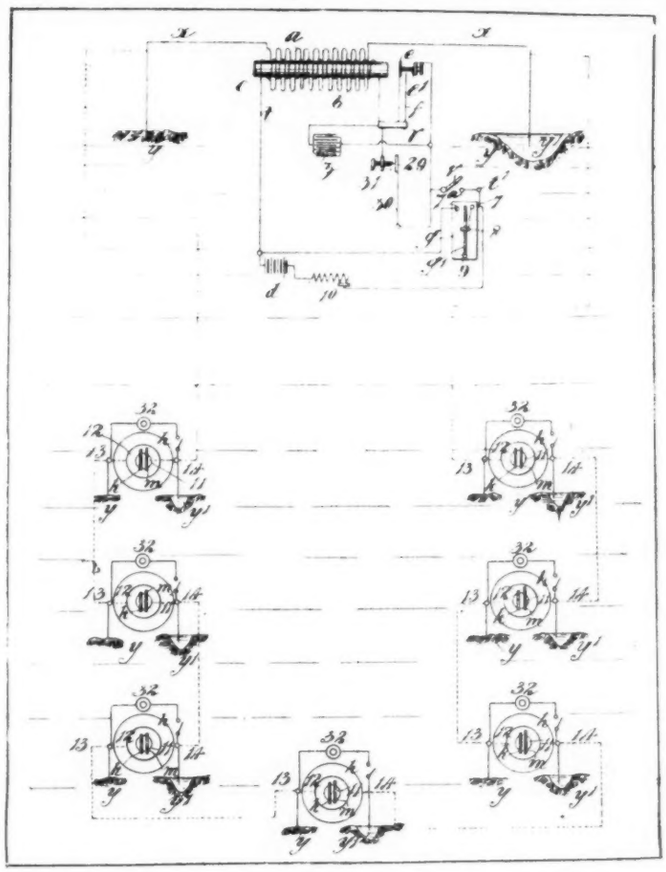
teeth of a comb m, making and breaking the circuit. The contact arm o is thrown into and out of the path of the teeth for its upward and downward travel by posts q and p respectively. The comb is the gist of the invention and is shown in Fig. 2. Any code number can be given by bending the proper teeth.

751,228—Cable hanger. R. H. Villard and H. P. Copeland.

This is another hanger having a hook and a strap. The strap is so passed through the grip of the hook that the latter being raised up draws on both ends of the strap at once.

751,294—Apparatus for electrically transmitting and receiving messages. A. T. M. Johnson.

This invention has reference to improvements in harmonic telegraphy, in which transmitter and receiver are both fitted with selective reeds, in the present case in double sets respectively called "tuning reeds" and "speaking reeds". The first are constructed so that at each station they will vibrate at a rate differing from that of others, the latter being each arranged in proximity with a tuning reed and mounted so as to be brought up to an electro magnetic device, in conjunction with which and an adjustable contact screw it can be caused to act as an automatic vibrating contact maker and breaker whereby the circuit of the electromagnetic device can be opened and closed in a rapid and



751,294—FOR TRANSMITTING AND RECEIVING.

automatic manner, and electrical impulses can be transmitted at definite rates.

There are ten sheets of drawings, and nearly eight thousand words of specification and claims in this case, all obviously adapted from the English application, and therefore verbose and indirect. Mr. Arthur Thomas Metcalf Johnson, of Highbury, England, is the inventor, and he started handicapped in life by a rather verbose presentation of "Too much Johnson," and the habit thus originating is doubtless harmless, but it makes tedious reading.

The present invention has really for its object to transmit messages telegraphically or telephonically by cross leakage through the earth or water from one grounded circuit to another one. By using double sets of selective reeds Mr. Johnson finds it possible to "enable a general telegraphic message to be sent simultaneously to all the receiving instruments . . . and also a particular or secret message to any one."

In the diagram a is the induction coil at the transmitting station, and h-h-h-h-h-h are receiving coils at receiving stations. The nice straight dotted lines in the diagram indicate the precise course taken by the currents, and the horizontal broken lines simply indicate in a general way the elementary substances through which they pass.

The reason I review this patent is that Mr. Johnson says

he can telephone over this same circuit and by means of the same apparatus. In such case, however, a preliminary telegraphic message is sent by the Morse key g apprising the happy receiver of the intended message.

751,344—Telephone receiver. L. Sands and C. C. Cadden.

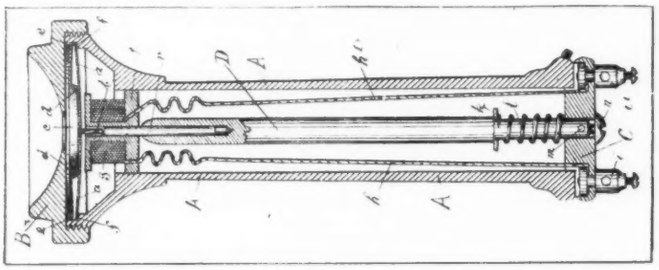
This is a receiver having all of the magnetic structure and connected parts carried on a stamped metal cup on which rests the diaphragm, this type having been made familiar by our friends Burns and North. The cord comes in through the usual orifice in the small end of the shell, has its sheath fastened to the magnet and its two conductors passed inside the magnet limbs with their tips inserted in metal sockets in the insulating block. The tips are secured by binding screws, and the sockets are respectively connected to the two terminals of the coils.

751,354—Insulated wiring tack. D. G. Smart.

This is a tack having a T head, with a two-fold insulating washer under it, so that the tack can be used to fasten twisted pair without danger of short circuits. The head is flattened out and presents a rather ornamental appearance.

751,501—Electric telephone. E. Gundlach.

The object of this invention is to increase the differences of the force of magnetic attraction of the magnet and diaphragm of a receiver caused by the undulatory changes in strength of the telephone current. A very able dissertation is given on the theory of the instrument, and two conclusions reached: First, that the current being alternating, the pole piece need be magnetized only to a degree equal to that produced by the sum of the opposite variations; second, that for efficiency the diaphragm must be under tension. It is stated that by far the greater part of the permanent magnetism could be dispensed with and the magnet ren-



751,501—ELECTRIC TELEPHONE.

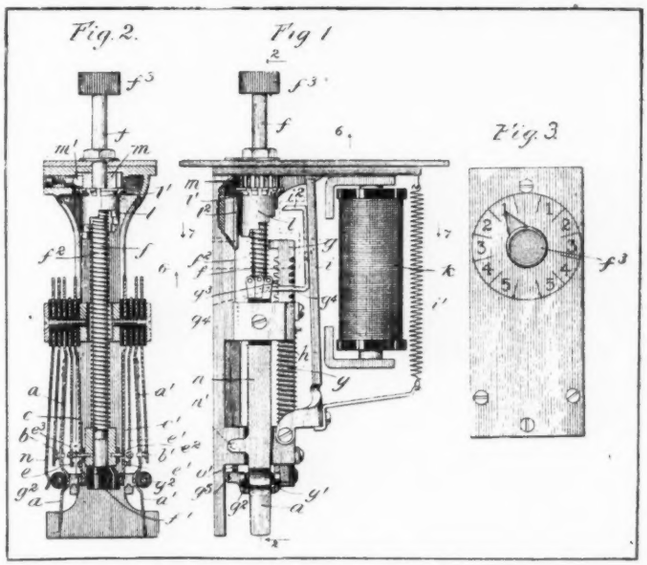
dered much more sensitive to the influence of the current if the tension of the diaphragm be produced by mechanical means. To this end Mr. Gundlach shows in the figure a permanent magnet with a small pole piece of soft iron, and the diaphragm a of spring hard hammered or rolled iron, about two inches in diameter and 0.010 thick. In the center is a soft iron pole piece b secured to it, this about 1-12 inch in diameter and ¼ inch long. The diaphragm is put under tension by an annular "tension spring" c, of hard rolled alluminum 0.010 thick. The inner circular edge d is bent down on the diaphragm, and the outer edge is bent up at e to be pressed down by the cap.

Several modified forms of springs and diaphragms are shown, the principle being the same in all.

751,539—Ringing key for telephone switchboards. F. R. McBerty.

This is a party line selective ringing key. The principal feature of the apparatus is a plunger which can be turned or twisted from side to side to determine which side of line shall receive current, also the extent to which a second plunger shall be depressed, the latter being returned step by step, and the number of steps therefore determining the number of rings.

In the figures herewith, Fig. 3 shows the top of the key. By turning the handle f^3 to right or left one side or the other of line is selected, and the proper number of rings determined. The handle is then pushed down to ring. In Fig. 4, G is the grounded generator for ringing, with a periodic interrupter d. The entire set of springs for the key is shown with connections in this figure. The inner springs c and c′ both go to generator, and one or the other is pushed against the outside spring e or e′ and thereby connected to the tip spring a or sleeve spring a′ of the

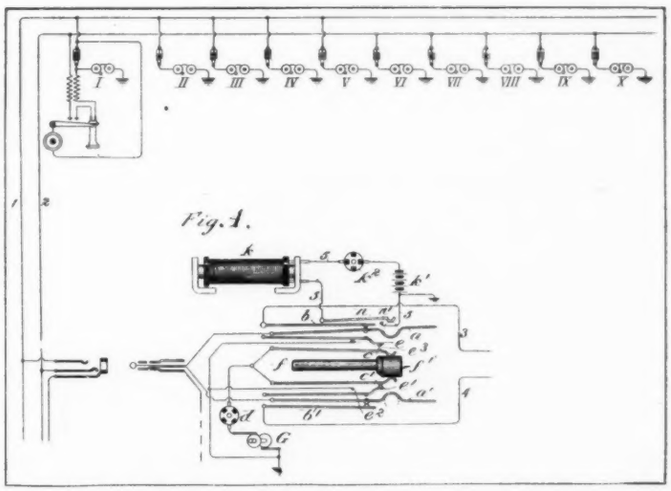


751,539—RINGING KEY FOR SWITCHBOARDS.

calling plug, according to which direction the rubber cam f′ on the plunger f is turned.

This selects the side of line. To ring, the springs a and a′ are moved inward on to the generator springs by a pair of rollers g^2 on a yoke g′ carried by the second plunger g which is normally held up by the spring h. This plunger has escapement teeth on its upper end, into which work scape teeth g^4 carried on the armature i of a magnet k, which is periodically excited, being controlled by the commutator k^2 in the diagram.

The first plunger f has a collar 1 cut away in stair-steps, these engaging the top of plunger g when plunger f is pushed down. Obviously the extent to which plunger f has



751,539—RINGING KEY FOR SWITCHBOARDS.

been turned, as above stated, will determine which step will engage g, and hence how far down it will go, hence again how many steps it will take to come back, that is how many rings will be given.

A dog is provided which prevents the depression of the

plunger f, except when the plunger g is in its uppermost position to hold the dog out of engagement with plunger f.

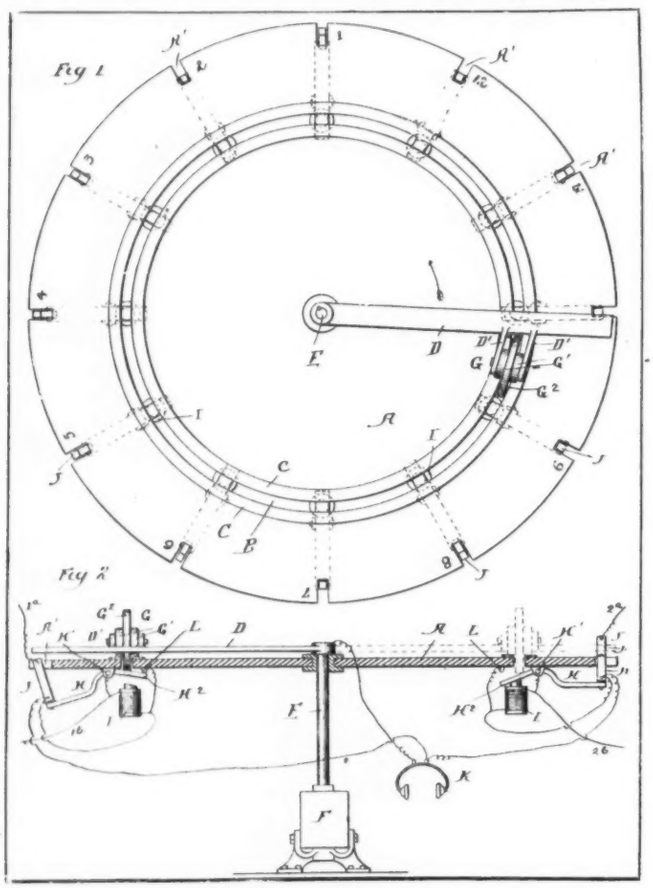
In order that the plunger may not be depressed when the commutator d would give a half ring instead of a whole ring the first time, a dog i^2 is carried on the upper end of armature i, which holds down the plunger f after it is depressed, and hence holds the cam f' down below the springs c-c' until the commutator k^2 energizes the magnet k once. The plunger f is then restored and the generator put to line. For this reason there will always be one more pulse of current in magnet k than of ringing current to line. Commutators d and k^2 are preferably driven on the same shaft.

751,556—Ringing key for telephone switchboards. C. E. Scribner.

This device is precisely the same as the preceding one, except in the provision of means for preventing the starting in the middle of a ring, etc. The broad invention appears to be Mr. Scribner's, and the details Mr. McBerty's. The applications were filed the same day and the patents issued together.

751,655—Telephony. Isidor Kitsee.

By this device all listening in by operators is to be prevented, all favoritism in answering calls, and all strain on the operator's memory, are to be removed. Subscribers' lines come in and are connected around a disc to springs, 1a, 2a, etc., being thence connected through springs j and



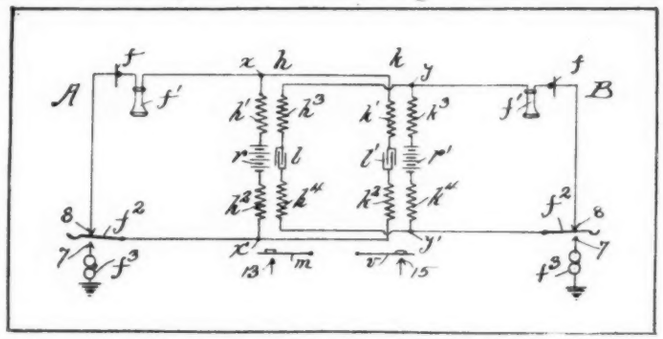
751,655—TELEPHONY.

magnets I out by wires 1b and 2b. The magnets are normally shunted at L, and the scheme is that the subscribers shall be answered in rotation. An arm D having a wheel G^2 is constantly driven around the disc, and as it passes it unshunts one magnet after another. If a subscriber is calling at the moment his magnet is unshunted his arm H will pop up and at the next revolution the arm D will engage the spring J and connect him with the operator's set. The specification says it will connect him with a lamp first, but this is not so.

I reproduce two figures of the drawing in this case to show what can be done in the way of a paper invention. If this disc is in one piece the rim of it will fall off. It needs some legs, and brackets and things. Dr. Kitsee once invented a telephone system that was bought by the Bell company, but I never heard it was used. Perhaps they will buy this invention.

751,797—Central energy telephone system. John H. Lendy.

This is a scheme for combining the repeating coil and the supervisory relay in the circuit of the Kellogg company, which owns this patent. There are two main batteries, and there are two repeating coils, connected to each line in parallel. These may be combined into one. Suppose in the figure that one coil h has its winding h'-h^2 connected to the line of station A, and its other windings h^3 and h^4 connected



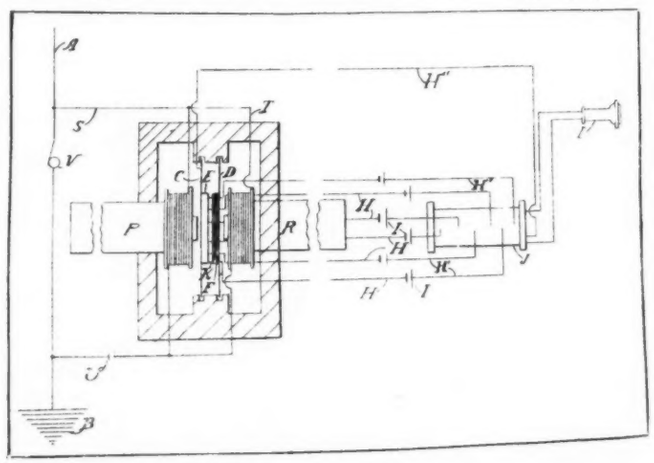
751,797—CENTRAL ENERGY SYSTEM.

to the line of station B. Similarly the coil k has the windings k^3 and k^4 to station B, and k' and k^2 to station A. Between the windings h^3 and h^4 is a condenser f; while between the windings k' and k^2 is a condenser 1'. Thus each station is connected to two coils in parallel, but has battery current to only one of them. Station A thus controls battery current in the coil h only, while station B similarly controls current in the coil k only. Hence each station may utilize the coil it controls as a relay for the supervisory signal.

These coils are of course to be included in the cord circuits as usual.

751,818—Electrically produced sound intensifier. G. T. Swenson.

This is a means for intensifying signals, as for instance in making louder code sounds in wireless telegraphy. In



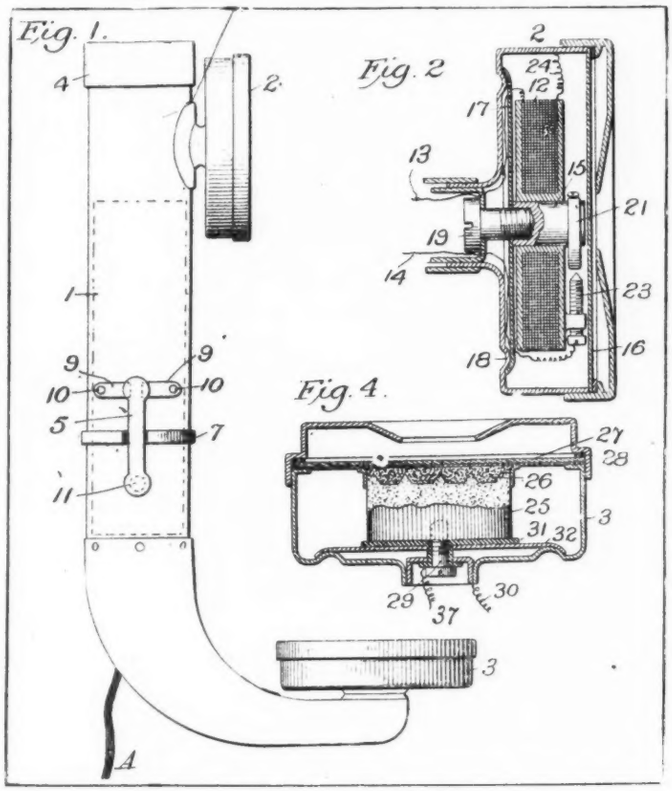
751,818—SOUND INTENSIFIER.

the diagram A is the mast-wire, V is the coherer, around which two electro-magnets, P and R, have their windings connected in parallel with a common battery U. These two magnets act oppositely on a pair of diaphragms, C and D,

carrying carbon contacts bridged by platinum wires. Each pair of contacts is separately connected in a primary circuit H-H′, I or I′, all connected to primary windings on induction coil J. to the secondary of which is connected the receiver L.

751,829—Telephone. E. T. Billig.

This is "a simple and cheap" portable telephone. I quote from the specification. Fig. 1 shows the tubular sheet metal handle, carrying the switch 9-10-11, the receiver 2 and the transmitter 3. The receiver and transmitter are shown re-



751,829—TELEPHONE.

spectively in Figs. 2 and 4, and hardly need description. The switch has a double action, one side ringing and the other closing the talking circuit. The receiver magnet 15 carries a spring 21 on its pole piece which with a contact 23 constitutes a buzzer for calling.

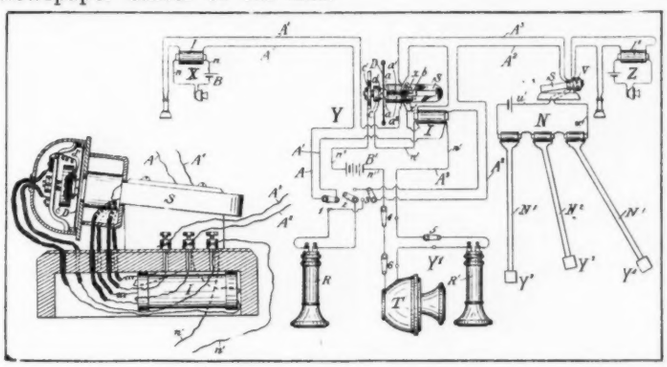
Two instruments are connected up with a pair of talking wires and a ground or third wire to the point 11 and battery. With one switch open and the other closed, signalling can be carried on, while with both closed talking is possible. The batteries can be enclosed in the handles.

751,845—Telephonic repeater. M. Gally.

Another telephone repeater. This scheme relates not only to the repeating circuits locally, but to a distribution scheme whereby "through" messages can be dropped off at intermediate points or way stations, according to telegraphic practice. One would suppose Mr. Gally to be an old telegraph operator.

The repeater proper is shown at D and in the separate figure. It consists of a receiving magnet in an inclined plane, with a microphone transmitter in front of it. A granular form of transmitter is shown, with points touching the receiving diaphragm.

In the diagram, A-A′ is one main circuit, A^2-A^3 the other, with terminal stations X and Z. The main line A-A′ goes to the repeating magnet a′-a^2, to the secondary of the induction coil I, and out. Line A^2-A^3 likewise goes to the coils a′-a^2, to the induction coil and out. Receiver R at the repeating station can be included in either line by means of switches 1, 2 and 3. Transmitter T is in the primary circuit of coil I, and receiver R′ can be so included. A separate repeater is shown at N, another station, for the purpose of distributing messages, as for instance to different newspaper offices or the like.



751,845—TELEPHONE REPEATER.

Coil I and magnets a′-a^2 are double wound, and each line includes its own connected windings only. Mr. Gally says this produces a perfect balance, and that the entire scheme makes a practicable repeating system.

752,184—Hanger for telephone transmitters. M. Setter.

This is one of the hangers for operator's telephone transmitters produced by the American Electric Telephone Company, to whom the patent is assigned. Although formed entirely of sheet metal, it is a neat and attractive design. It is not always easy in these hangers to get the suspension loop exactly in the vertical line of the center of gravity of the transmitter; and even if properly adjusted when fresh from the factory the hangers are apt to get bent if of sheet metal secured from the back only, as many of them are. The present device straddles the transmitter, being screwed to the back and clamped by the mouthpiece in front. Any displacement in use is therefore impossible. The general form of the blank is a double T, joined at the top. At each end of the T arm is an eye, with the metal formed up around it at *b5* so as to make all edges rounded, as though the opening were bushed, to avoid cutting the cords.

752,251—Automatic telephone system. J. K. Norstrom and J. J. Brownrigg.

This is a complete automatic system, including both subscribers' and central office apparatus, and operating with centralized battery for switching purposes and local batteries and generators for talking and ringing respectively. There are six sheets of drawing in the case showing many details of construction which cannot be referred to in brief, but the general design belongs to a type which has several meritorious features and all of the patents thereon merit a full reading by those interested in the development of automatic.

The subscribers' selector transmitters are of the vertical reciprocating type, a face view of one instrument being given in Fig. 1 and a rear view of the transmitter mechanism in Fig. 2. The central office switch is of the double-motion type, mounted on a vertical panel, and while shown for one hundred lines only, adapted apparently for multiple connections. It is shown in Figs. 7 and 8.

The subscribers' selector in Figs. 1 and 2 has three buttons *d-d-d* traveling in vertical slots and connected there through to contact slides *C-C′-C2*, each mounted on a vertical guide rod and having a contact adapted to co-operate with adjacent teeth to send impulses on the return or downward movement. When the slides are pushed up until the buttons are opposite the desired numbers, three pivoted racks engage with teeth to hold them up. After setting, the receiver is taken down and the hook in rising moves a cam to

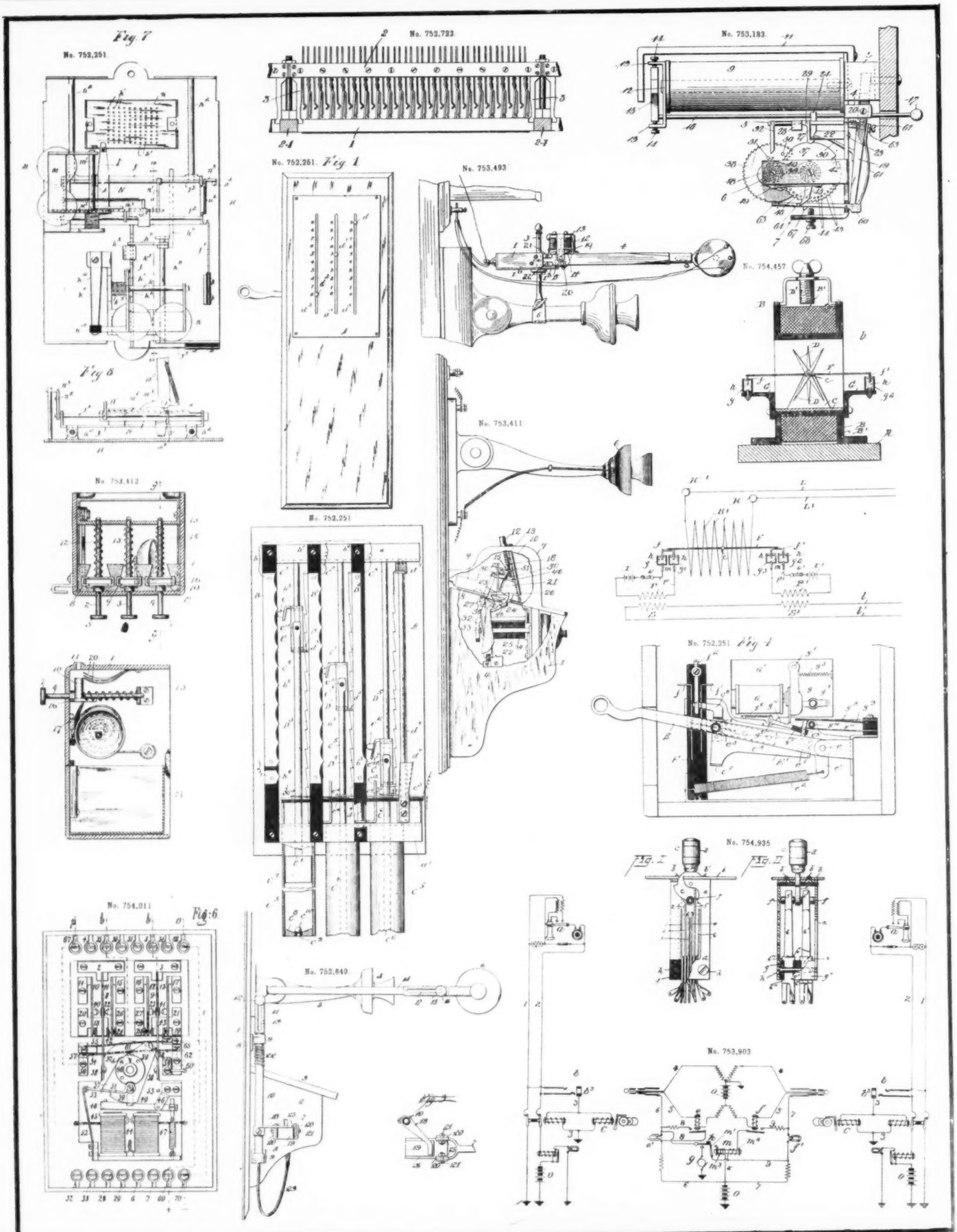


Fig. 7
No. 752,251.
Fig. 8
No. 752,732.
No. 752,251. Fig. 1
No. 753,183.
No. 753,493
No. 754,457
No. 753,411
No. 753,412
No. 752,251
No. 752,351. Fig. 1
No. 754,935
Fig. 2
Fig. 3
No. 754,011
Fig. 6
No. 752,649
No. 753,903

push back the first rack and release the slide *C2*, which comes down and sends one impulse only. This impulse steps up the selecting carriage of the central office switch to cut in the cross feed magnet. A cam face c^{11} on the slide C^2 acts on rod c^{12} to pull over the second rack and release the second slide, which sends the proper number of impulses for the "tens" component of the desired number, which effect a cross feed of the selecting carriage at central. The discent of the second slide similarly releases the third, which sends the "units" impulses, effecting the vertical feed of the carriage, landing the contact of the main switch on the desired terminal. The descent of the several slides, as well as the regulation thereof, is effected by heavy weighted pistons c^7 working in dashpots set to retard on the down stroke.

Referring to Figs. 7 and 8, the vertical panel *H* carries the insulating plate *h* with one hundred line terminals *h'*. The co-operating switch terminal is a spring arm *I* having a double motion, both vertical and horizontal. It is supported on a carriage *J* sliding on the vertical rods h^2, through the medium of a cross feed rack rod *N*. The vertical feed of the entire carriage is due to the magnet *K*, working a rack *j* by means of a suitable pawl on its pivoted armature. The cross feed is due to the magnet *M*, working the armature lever m^2 and pawl m^3. Each pawl has a tail by which it is tripped for restoring.

The first impulse from the subscribers' slide contact c^2 steps up the carriage one step, closes circuit with spring *J'* and leaves the magnet *M* in circuit. The next set of impulses then move the arm *I* across the panel to the desired vertical column, and it will be observed that the arm does not yet touch any contact, two steps up being required for that.

Beneath the slides of the subscribers' selector are spring circuit closers, the hook controls other circuit closers, and the central office switch still others. To trace the circuits in this brief is unnecessary, particularly as they are quite complicated. One feature, however, I will refer to. It is shown in Fig. 4, wherein the hook mechanism is illustrated. This is a latch cut-out for the talking circuit operated by the magnet *G* if the line wanted is busy, owing to reduced resistance at the distant end where the bell is cut out. This cut-out can only be closed after operation by hanging up the receiver, hence listening in is impossible.

In these days every one is watching the development of automatic apparatus, which is proceeding along beautifully symmetrical lines. The methods adopted are divided into two—straight multiple and transfer. The apparatus may be classified as either electrical or mechanical switching, and each of these again into single movement and double movement machines. The present device is a double movement electrical switch and belongs to the multiple type, vertical panel, straight feed. The improved Strowger switches are of the same type, but with curved radial feed. Other well-known apparatus that is soon to come out and which I trust to have the pleasure of describing at length when it does, is of the mechanical switch transfer type and semi-automatic ditto.

The present type is not as good as the others, for basic reasons. In an electric switch the moving parts should be reduced to the greatest simplicity, for obvious reasons. Where power is supplied to mechanism which is only controlled by magnets, however, the moving parts may obviously have more mass. Here we have a carriage and considerable weight to be lifted and reciprocated horizontally by electro-magnets connected in complicated circuits and dependent for their operation upon a multiplicity of moving mechanical parts. Consequently the chances for trouble are greater than they would be where either the mechanism was not involved with the circuits (entering each factor twice in the equation) or where the circuits were complicated and the mechanism simple, thus reducing one factor to a harmless quantity. Comparisons are, or course, invidious, but every helpful suggestion should be welcomed by the workers who are thus developing along different lines the apparatus of the future.

752,408—Electrical apparatus for producing sound signals. G. H. O'Brien.

The word "howler" having come to have a specific meaning, i. e., a receiver and transmitter adjusted to react on each other, I suppose I shall have to call this device a "screamer." Its object is to make a noise, and it is intended to be used on electric street cars, locomotives and the like, and I may add it would doubtless prove quite useful to salesmen selling telephones in the country districts. A large noise is frequently impressive to the untutored mind, as every election day demonstrates, and as every telephone man knows.

The invention comprises an iron tube wound with primary and secondary, the former in a local circuit *j-l* containing a battery *k*, and the latter on closed circuit with receiver magnet coils disposed inside the tube, the magnet acting on a diaphragm *f*, in front of which a megaphone attachment *h* is secured. A vibrating circuit breaker *i* is included in the battery circuit, and when it is started both the permanent magnet and the tube act on the diaphragm to inflict upon the ambient atmosphere a powerful and inspiring sound.

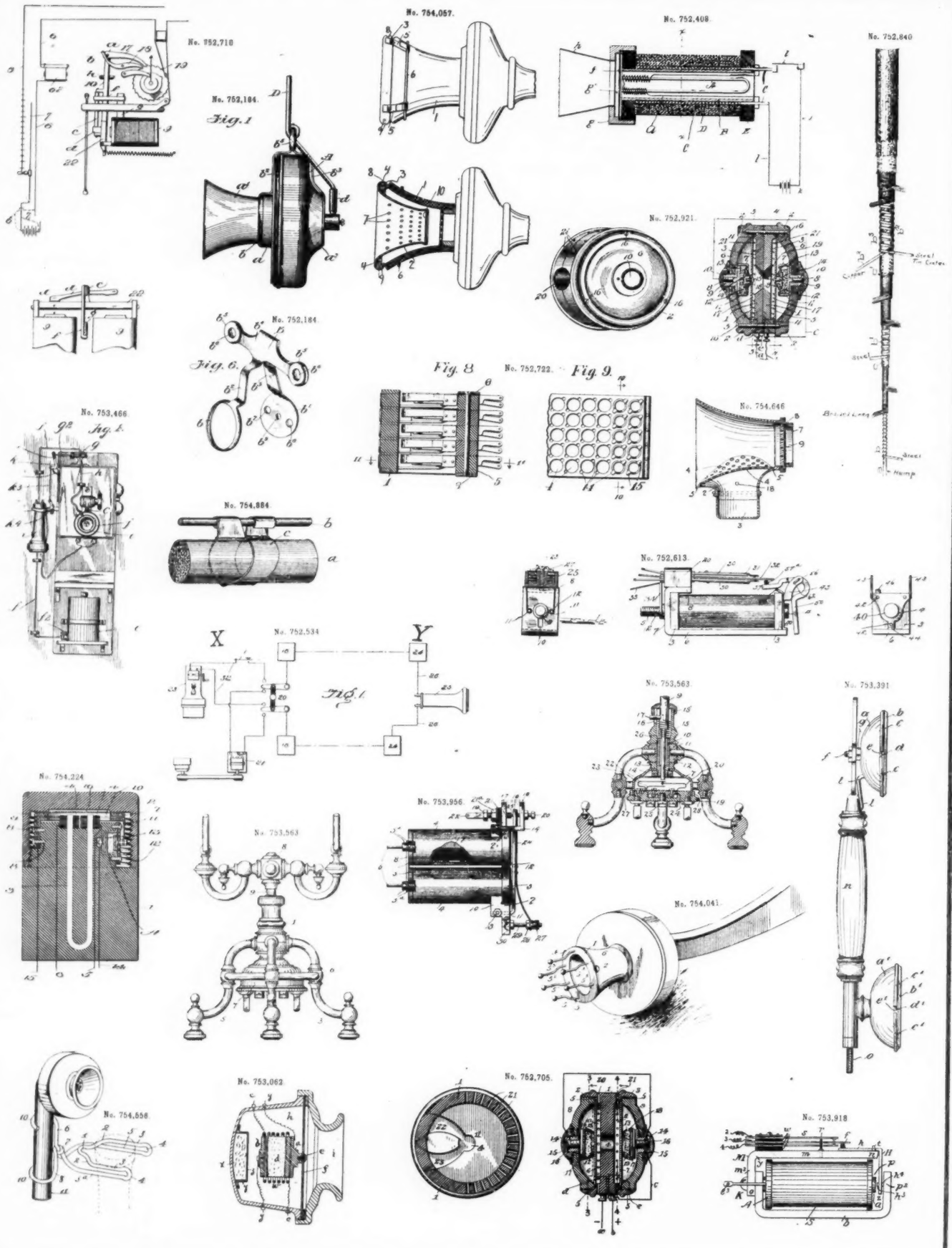
752,534—Method of transmitting intelligence through the natural mediums. D. Drawbaugh.

The rupture of a dielectric by a high potential discharge, followed by an arc due to eletromotive forces at lower potentials, is an old and familiar proposition. While the principle thereof is perhaps not distinctly involved in the present case, there is a similarity that will perhaps make Mr. Drawbaugh's theory more easily understood. He says his invention comprises a new method for terragraphic and teraphonic transmission, having as its essential feature the reduction of the resistance of the earth or other natural media by impressing thereon currents of high potential, which may be conveniently produced by a magneto generator of peculiar construction patented July 21, 1903, under the number 733,948. These high potential currents, he says, greatly reduce the resistance of the medium, so that the lower tension telephonic or telegraphic currents can be used to transmit a message.

In the figure a telephone system is shown in which one instrument *23* at a point *X* is connected through a switch *20* to separated earth plates *18-18*, from which the current is supposed to flow through the earth along the dotted lines to similar earth plates *24-24* at station *Y*, where a receiver *25* is connected. The switch *20* can be thrown over to cut out the telephone and cut in the special generator; and Mr. Drawbaugh says that after this generator has been pumping its current through the earth for two or three minutes, the distance over which transmission is possible is increased. Also for the same distance of transmission the articulation is improved.

752,613—Relay. A. Carliss.

The type of relay here shown is now very familiar in the Independent field, its distinguishing characteristics being the bent armature lever pivoted at one end of the shell, and the contact springs lying along the top thereof. The present is really intended for a cut-off relay, and the invention lies in a number of improvements in matters of detail. A longer armature lever is secured by using projecting yoke arms *43*, and a wire pivot is employed with a bent end to hold it in place. The iron strip *6* constituting a part of the magnetic circuit has a return portion *8* carrying the insulating block *20*, which is provided with two channels for the contact springs *30* and their interposed insulating strips. The


No. 752,718
No. 752,184
Fig. 1
No. 754,057.
No. 752,408
No. 752,840
No. 752,921.
No. 752,184
Fig. 6.
Fig. 8
No. 752,722.
Fig. 9.
No. 753,466
Fig. 5.
No. 754,646
No. 754,884
No. 752,613.
No. 752,534
X
Y
Fig. 7.
No. 753,563.
No. 753,391
No. 754,224
No. 753,956.
No. 753,563
No. 754,041.
No. 753,062.
No. 752,705.
No. 754,656.
No. 753,918

springs and strips are held in place by a cap-plate *27* and a screw *23*, which passes through into the support *8*, thus holding on the block as well. The contact springs have the usual tails for wire connections, and the lowermost pair are extended down to the terminals *11-12* of the relay winding, so that all wire connections are uniform. The armature yoke is shown in Figs. *1* and *3* as punched and formed up out of sheet metal.

752,649—Telephone attachment. G. B. Buchanan.

Many inventors have produced devices for holding the receiver at the ear without requiring the use of the hands, but most of these devices have been patch-work affairs, attempting to perform a new function with makeshift apparatus. The main difficulty has always been the switch hook. I can understand one reason for this is that the inventors have wanted to make an attachment that could be put on any telephone. Even this, however, cannot excuse some of the monstrosities that have been offered.

In the present case the idea is a neat one, and its embodiment is quite mechanical. A vertical tube *10* is journalled in bearings in the ends of arms *8* screwed to the back-board *1*. Telescoping with the top of this tube, and having a set-screw *12* in a limiting slot *13*, is an elbow *11*, carrying the horizontal tube *14* bearing at its end a short telescoping section of tube *15*, also provided with a set-screw and limiting slot. Upon this is supported the receiver *6*. The core *23* passes up through the tubes, and the tubes can be set vertically and horizontally as desired.

Upon the lower part of the vertical tube a horizontal arm *18* is fixed, so as to turn in and out over a cam *19* attached to the switch-hook *20*, as the receiver is moved from side to side. The latter is normally kept over to the right by the spring *22*, holding the hook down, but is forced to the left by the pressure of the ear during use.

752,705—Audiphone-receiver. H. G. Pape.

A number of instrument sets have been put upon the market, intended for the use of deaf people, a sensitive transmitter being carried on the person, together with a small pocket battery, connected with a receiver specially fitted to the ear. The present patent covers a transmitter for this purpose. It consists essentially of two transmitters fastened face to face, but separated by a thick wall having a hole in it, and edgewise openings into this hole. Speech is directed against the edge, and passes through the openings waves which thus reach both diaphragms. The claims are necessarily limited, and are not directed to the construction of the microphone. Around each diaphragm is a series of small vents which prevent excessive pressure or reverberation.

752,710—Means for synchronizing the instruments of telephone systems. H. Redmon, R. L. Hall and R. H. Conway.

This is an improvement in step by step selective instruments for party line work. One instrument on a line is liable to get out of step with others, and the inventors say that heretofore it has been necessary to send a lineman out to remedy the trouble. This is a serious drawback to any system, but not a new one. No lesson can be so well learned in this world that it will never need teaching over. How many of the old-timers know that synchronism spells trouble, and know it by personal experience acquired when there was more excuse for verdant and unsophisticated innocence of primary principles than there is now. True, synchronous telegraphs are used, but there is a great deal of difference between a skilled operator who is careful by instinct to do the right thing at the right time and the sort of a gentleman who ordinarily uses a selective party line telephone, with many parties on one line. However, the present invention cures all the trouble. If any instrument gets out of step they can all be thrown back to zero by simply reversing the direction of current on line. It works like this: The step-by-step wheel *19* is moved around by the magnet *9* as impulses come over the line from the transmitter *6-7* at central, through the agency of a pawl *17* on the armature lever *10*. A separate stop pawl *18* is pivoted independently, but has its tail sticking up behind the step pawl so that the wheel can be released from both pawls if the lever *10* is thrown back far enough. Ordinarily the lever can only move back a limited distance because of a hook *f* carried by a rod *c* pivoted on the lever *10* and carrying at its lower end a polarized armature *d*. The normal current on the line is of the right direction to cause the armature *d* to be turned in, as shown in Fig. *2* herewith, and in this position the hook engages a stop bar *g* to limit the movement of the main armature lever *10*. If the instruments go on a strike, however, and refuse to work in step, the operator can throw over her pole changing switch, reverse the current to line, which throws over the armatures *d*, and thereby throws out the hooks *f* from bars *g*, and then breaking the circuit can cause all armatures *10* to fall back far enough to release all pawls, and allow all mechanisms to go to zero, whereupon a fresh start may be taken. The specification does not explain how the operator knows when the selectors are out of step.

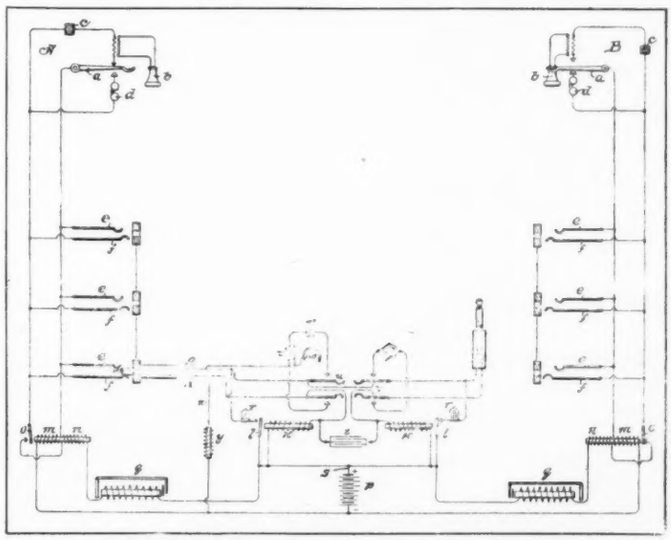
752,722—Switchboard. A Stromberg.

This is an improved jack-strip, or, rather, bank of jacks, for switchboards and particularly multiple-boards. Five rows of *20* jacks each, or 100 in all, are carried by each unit, which consists essentially of a solid front-plate *1*, and a back frame or plate built up of strips *5*, secured together by cap-plates *6* and connecting screws. The contact-springs are laid in slots in the top of each strip *5* and held in place by the next strip above. The test thimbles are secured in the front plate by beads on the front ends, and small ears *15* on the inside ends. The stems of the test-thimbles are riveted to one of the line-springs, making a two-wire circuit.

Each bank of jacks is secured in place by metal end-strips *3*, recessed to take the bolts set in the stiles *24*.

752,761—Multiple switchboard system. W. M. Davis.

This is an improvement on the system patented to Harry G. Webster, under the number 688,452, the idea being to avoid the necessity of having a break in the line at the line



752,761—MULTIPLE SWITCHBOARD SYSTEM.

or cut-off relay, which has to be held closed during a conversation. The application was filed Dec. 7, 1900, and the patent is assigned to the Stromberg-Carlson Mfg. Co.

The gist of the invention lies in taking an extension of the

line to the differential cut-off relay, one side then going to the line relay and both sides to battery. When the subscriber calls, current in the two windings of the cut-off relay produces equal and opposite effects, neutralizing each other. When the operator plugs in, current flows from the main battery *p* through the supervisory relay *k*, cord conductor *h* and spring *f* to line, shunting the winding *n*. The winding *m* then magnetizes the core and pulls up armature *o*, cutting off the coil *n* and the line-signal *q*.

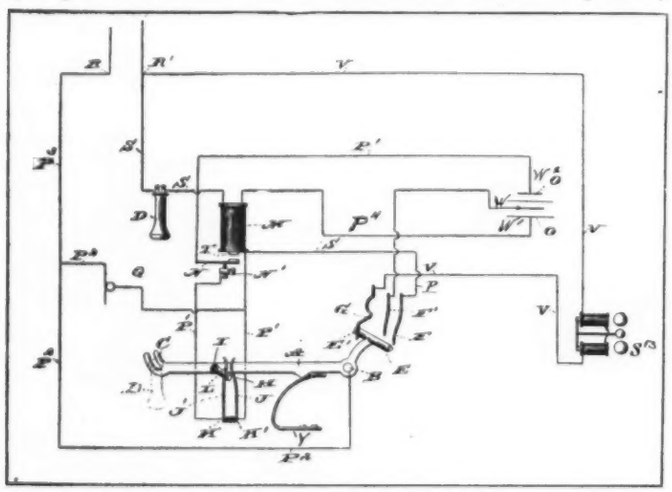
The test rings are normally disconnected from the line and battery. When a plug is in, however, the rings of that line are connected back through the relay *k* to battery. The test circuit to the operator's telephone is normally complete when the key *u* is thrown over, through the coil *y*, and back by way of the lamp *r*. The tip being touched to the ring of an idle line, no change in this circuit is produced, but if to a busy line then the balance is disturbed and a click results.

752,840—Flexible conducting cord. (Assigned to the Western Electric Company). H. B. Holmes.

Cords break most frequently at the base of the plug, after first flattening. Where there are several strands the breakage of one or two is not always apparent, although the resistance of the circuit is perceptibly raised. The present cord is intended to maintain its circular cross section under all circumstances, and to have only one strand for each telephone circuit conductor, so that its rupture will be at once apparent. The construction is apparent from the figure herewith. The hemp cord in the center takes the longitudinal strain, and the armoring is to preserve the shape.

752,909—Telephone signaling mechanism. O. O. Lee.

This is a scheme for signaling without a generator from a local battery telephone sub-station, by the use of an induction coil with a vibrator attachment. As the hook *A* goes up it momentarily closes the circuit *P*. between the springs *J*-*J'*. This circuit includes coil *M* on the primary



752,909—TELEPHONE SIGNALING MECHANISM.

side, and its vibrator *N*. During the closure at *L* the coil gets in its work, secondary impulses go to line by the following path: *S*, *D*, *P*, *B*, P^2, P^3, and the drop is thrown down. The transmitter *Q* takes only a portion of the battery by the following path: P^2, *B*, *E*, *F'*, *W*, *W'*, P^4, *M*, *Q*.

752,921—Audiphone-receiver. H. C. Pape.

This is another form of the audiphone referred to above. Two microphones of the White or solid-back type are placed face to face, separated by a partition with a hole through it, having oppositely inclined conical walls. A radial opening is made from the edge of the device into the central opening, and in the air-chamber which overlies each diaphragm a number of openings are produced through the casing which are said to prevent reverberation and excessive air pressure. The specification is very poorly drawn, describing the diaphragms as of thin carbon, with a solid-back button, which is a manifest absurdity. The instrument is called a receiver, which may be true of its function as stated to a layman, but is not accurate in a technical sense. The claims are apparently all limited to a series of openings *21*.

753,062—Microphone. Pierre Germain.

Monsieur Germain is a chemist, and this invention brings into the sordid atmosphere of our telephone art a breath of old world romance. It will be remembered that in that delightful story the Count of Monte Cristo, there is a gentleman connected with the telegraph service who has a passion for roses, and one pictures the waving arms of the semaphore telegraph against the bluest of skies flecked with the fleeciest of clouds, solemnly transmitting the quotations from the Bourse, or the last doings of Don Carlos in Spain through the fragrance of a field of roses.

Monsieur Germain is an inspector of telegraphs, and he hails from Fontenay aux Roses in the Department of the Seine. We must feel, with all respect, that his advent is refreshing. Here, indeed, is poetry to soften the aridity of science.

The invention consists in enclosing microphone elements in an air-tight chamber of which the front is the diaphragm, heating them by means of a coil to about 80 degrees centigrade, and absorbing all the oxygen out of the air, leaving an inert atmosphere. To improve the conductivity, lower the resistance, and increase the volume of current, oxide of silver is mixed with the carbon *d*. The material for disposing of the oxygen is inclosed in a pill box at *x*, and the heating coil is shown at *w*. The chemical consists of potassium or sodium (preferably the latter), which has an affinity for oxygen and whose base, formed by the oxidation of the metal, has an affinity for water vapors and carbonic acid. The microphone being sealed up with the sodium in it, everything is promptly absorbed except the nitrogen of the contained air.

The reason for all this is simply that nitrogen will not support combustion, oxygen being required for that purpose; hence there is no danger of burning up the granular material by an excessive current!

In this country we prefer not to use the excessive current, but it is to be feared that we are neither poets nor scientists.

753,067—Telephone or telegraph system. Robert Hamilton.

This is an improvement on systems described in patents Nos. 654,757 and 673,796, to Jackson. It relates to step-by-step selective apparatus for party-line systems and has particular reference to means for restoring the apparatus to normal from an outside point, such as central, so that the stations cannot be left locked-out by the carelessness of subscribers. A secondary function is to synchronize the instruments.

Referring to the diagram, *C* is a talking-circuit common to all the stations and *a12* is a signaling or selector circuit also common to all. The talking circuit is continuous, with normally open branches to the telephones in multiple, while the signaling circuit is normally continuous, but may be broken, and has its controlling mechanism in series. The first feature is the selector, which at each station consists of a disc *a4*, carrying a pin *a14*, which is differently placed at each instrument. These pins control the contact springs *a2* included in the telephone branches. The proper number of impulses sent over circuit *a12* will close the telephone circuit at any desired station. The disc *a4* is controlled by an escapement *a6* working in wheel at *a5*, and the disc carries a synchronizing tooth *a15* co-operating with the tooth *a16* on the end of the lever *a17* constituting a polarized armature for the selecting magnet *a8*. Normally all of these

levers lie out of engagement to the left, as shown, and can only be thrown over into engagement by a reversal of current on the line.

In selecting, the operator at any station moves around the disc *b*, which in rotating opens and closes the spring *a10* to open and close the circuit *a12* the desired number of times, the particular station selected then having its pin *a14* brought under the spring *a2* to connect the telephone *A* to the line *C*, leaving all other telephone branches open. If after concluding this conversation the operator fails to send the required impulses to restore the various selectors, the line might be indefinitely hung up, but according to the present invention a pole-changer *S* and a switch *S'* are included in the signaling wire at some point, so that this restoration can be effected and at the same time the instruments can be synchronized if desired. By throwing the switch *S* to the right current from the battery S^4S^4 is reversed, all the levers *a17* move to the right, and the switch *S'* is then opened and closed to step all the mechanisms back as indicated by the arrows until the stops *a15* come on the teeth *a16*, after which the switch *S* is restored to the position shown and the line is again in condition for use. These switches *S* and *S'* may be placed at one of the stations, so that the operator or subscriber thereat can clear the line at intervals.

753,183—Telephone selective device. W. D. Watkins.

This is a party-line step-by-step selective device worked by the ringer magnets, the two magnets being supported on a frame *2*, and having at one end the vibrating armature *15* carrying the clapper rod *16* as in all ringers, while at the other end is a soft iron armature, non-polarized, *19*, pivoted at *20* and adapted to be drawn up to the magnet poles on every closure. A guard-disc *37* has a notch *42*, differently situated in each instrument, and this notch when brought up beneath the pivoted lever *22* unlocks the latter so it can drop if released by the catch *27*. The lever *22* is pivoted at *23* and has an upwardly extending arm *24* normally holding the clapper rod *16* against vibration. The catch *27* is pivoted at *29* on the frame and is weighted at *28*, so that it normally holds the lever *22* up into locking position. A bell-crank lever *32* is pivoted at *5* and engages the weight *28* so that if the arm *32* is pushed to the left it moves idly, but if pushed to the right it lifts the weight *28*, trips the latch *27*, and then if the notch *42* is in position under the edge of the lever *22* the latter will fall and release the clapper rod.

The armature *19* carries at its lower end the pawl-lever *60*, having an end tooth *76* to engage the teeth on disc *38*, and a tooth *64* to work the pawl arm *46* of the guard-disc *37*. In calling, a subscriber sends impulses rapidly in number sufficient to step around the guard-disc *37* at the desired station with its notch *42* under the lever *22*. Each impulse moves the disc *37* one tooth, and also throws around the disc *38* so that the pin *50* passes behind the end of the lever *32*, and the pin *51* releases the detent pawl *48* to hold the disc *37* as it is stepped. The disc *38* tends to swing back at each impulse, but does not move far enough to trip before the next impulse comes. At the end of the number of impulses required, however, the circuit is held closed, the disc *38* swings around to the right, the pin *50* pushes over the lever *32*, lifts the weight *28* and trips the lever *22*, which drops in the notch *42*, and the clapper rod vibrates to ring the bell. Then the circuit is opened, the armature *19* is released, the arm *30* raises the lever *22* so that it latches, and the spring *39* returns the disc *37* to normal as shown.

This is one of a series of devices which are very ingenious and well worked out. Their efficiency would seem to depend on accuracy in manufacture and care in adjustment. Like all step-by-step devices, they would be subject to much wear, and it would seem that unless the working parts be made of hardened steel this might impair their usefulness. The Ness fly-back switch made by the Holtzer-Cabot Co. is an example of what excellent workmanship and care in the choice of materials can do in making a delicate apparatus stand wear and still be reliable, and I should say that with the same care in manufacture the present devices would be useful if only by reason of their simplicity.

753,252—Telephone repeater. M. Gally.

There are three features of invention in this case, which covers a repeating system. The first is that the bi-polar receiving magnet *S* has twin windings on both poles, one winding connected to each of the main lines *A-A'* and A^2-A^3. The windings are alike, the secondaries of the two coils *I-I'* are wound alike, and the inventor says: "There is no possible confusion in the combined operation of the whole."

The second feature relates to the repeating transmitter *d*, which consists of a solid-back microphone having three projecting points of wood on its button resting against the diaphragm *D*, which is controlled by the receiving magnet *S*.

The third feature consists in having a transmitter *T* at the repeating station, which can be cut in or out of the repeating primary to talk over either line, this being accomplished by switch *4*.

In operation all messages between the terminal stations are supposed to be re-enforced by the intermediate repeater.

753,391—Casing for telephones or microphones. P. Hardegen.

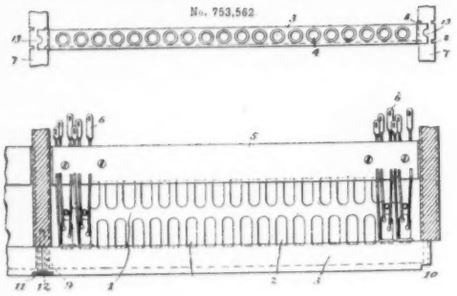
This inventor is a German, residing in Berlin. He makes a combination instrument having the receiver *a* and the transmitter *a'* mounted upon a handle *n*. Each instrument is enclosed in a steel cup, upon which the disphragm rests, being confined thereto by a cover having two semi-circular springs *c* snapping over the edge of the cup. The cup and core *g* of the receiver are both in the magnetic circuit.

753,411—Telephone toll apparatus. G. A. Long.

Mr. Long does not confine his talents to the simpler types of apparatus, such as I have just referred to and such as would rejoice the heart of Mr. Wilson and others who want a cheap and reliable toll box. Quite the contrary. In the present case he indulges in five sheets of drawings, and they are all needed. The apparatus as a whole is not so large and devious looking, but it does several things and has several parts.

The general scheme of the invention is this: It is intended for use with common-battery telephones and to be mounted preferably on the desk of a wall set in each case. It has a casing *7*, which serves as a till as well as to cover the parts. Through this opens the coin slot into a runway where a coin when deposited is held by a pin *51* and the stud *19* of a trip lever. The receiver is then taken down, and if the desired connection can be obtained the conversation proceeds, but if not then the receiver is hung up and the operator returns the coin. This is accomplished without adding any extra magnets, the ringer being employed for the purpose.

The switch hook is locked by an overlying lever *22*, having a notched lower end, and can only be released by the deposit of a coin. When such deposit has been made, as stated, the plunger *12* is depressed and carries down the cam *14* (Fig. 4), forcing the coin against the pin *19* and so pushing back the trip lever *17* (Fig. 3), which has an arm *21* that forces down the bell crank extension *23* of the locking lever *22* until it releases the switch hook *4*, and also until it catches under the latch *26*. The switch hook being unlocked, central can be called in the usual way, and if the desired connection can be had conversation proceeds. At the conclusion thereof the receiver is hung up, and the hook lever again catches under the end of the locking lever *22*,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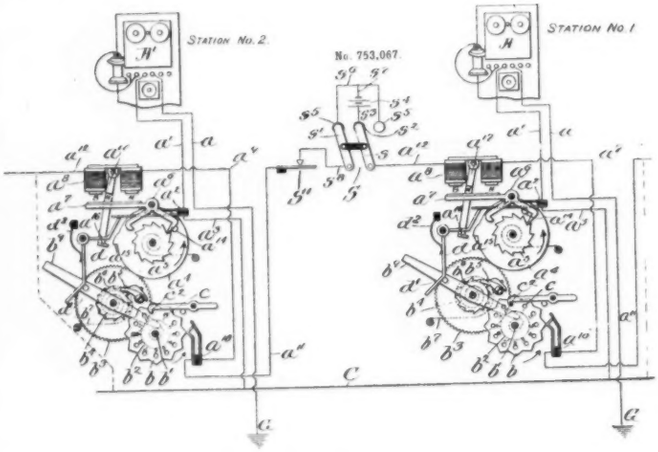
STATION No. 2.
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STATION No. 1

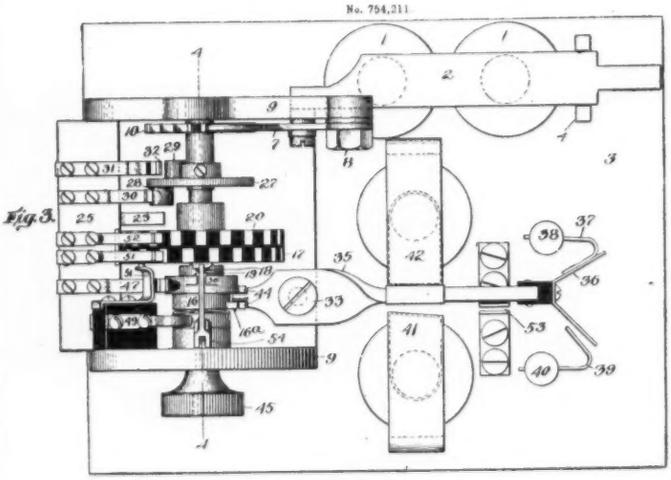
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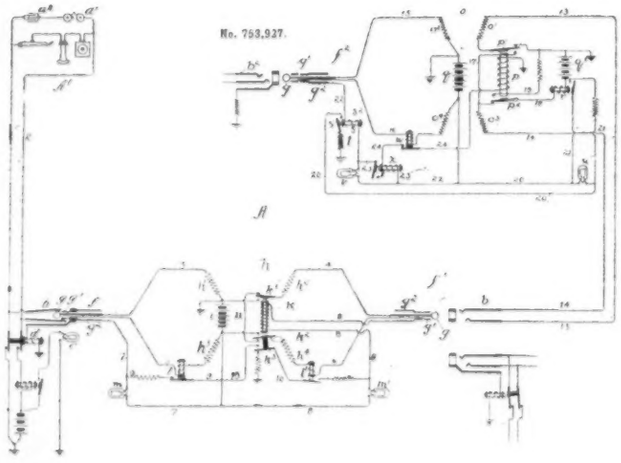
Fig. 3.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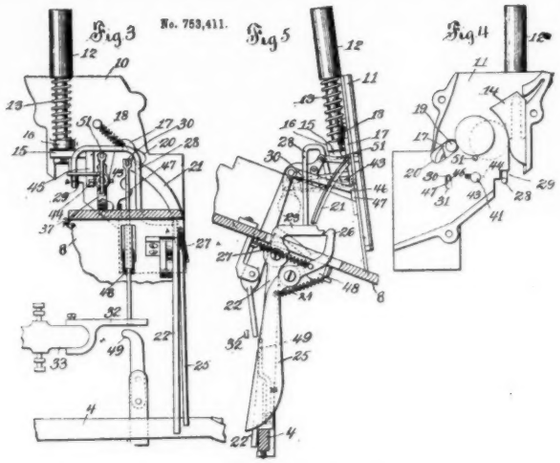


Fig 3
No. 753,411.
Fig 5
Fig 4

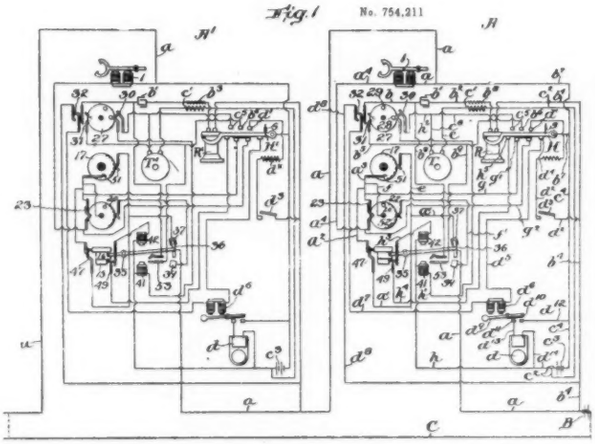


Fig. 1
No. 754,211

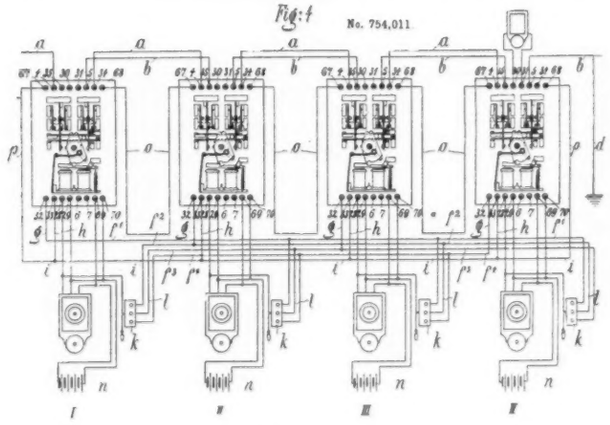
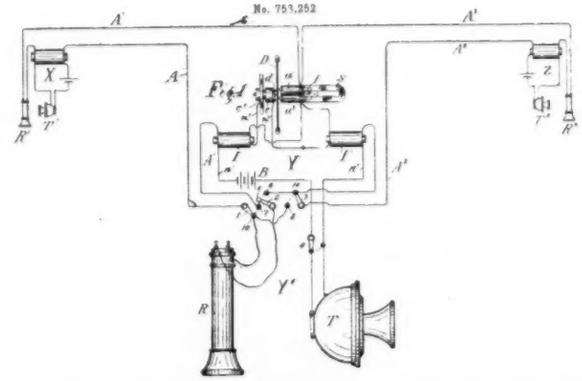


Fig. 4
No. 754,011


No. 753,252
Fig. 1

the latch *26* having been released when the hook lever rose, through the agency of cam *25*. At the same time the retaining holder *28*, which is carried on the lever *22*, is withdrawn, and the coin falls through the opening *29* and into the till.

If the desired connection cannot be had the plunger *12* is again depressed, without hanging up, and a cam *45* on the inside of the runway (Fig. 3) withdraws pin *41* and permits the coin to fall to the left (Fig. 4) and rest against the delivery holder *30*, which is on the upper end of a lever extending down into the path of an extension fastened on the ringer armature (Fig. 3). The receiver is then hung up and the operator rings up as usual. The agitation of the ringer armature pulls out the pin *30* and out comes the coin to the left.

This patent is also assigned to the Grey Company.

753,412—Telephone toll apparatus. G. A. Long.

With all the ingenious devices that have been presented, from the first tinkle-tinkle box that stood like grandfather's clock in the corner to the last and most improved toll taker of the Controller Company of America, it might be imagined that there would be little room left for further development. However, constant delving on the part of many workers every once in a while turns up some new idea, and here is another. The patent is assigned to the Gray Telephone Pay Station Company, but that does not necessarily cut an invention off from the Independent field, I am told. Instead of dropping his coins on the gongs he shoots them. Small coins deposited by mistake are returned.

In the figures the coin slots *11* are shown opening over short guide tubes *10* constituting the gun barrels. These rest over a notched plate *16*, so that coins of the correct sizes will be held, but small ones will fall through and by means of an inclined plate beneath will be thrown to the left and out into a return pan. After depositing a good coin and taking down the receiver, the user pushes in the proper knob *7*, whereupon the coin is forced back and up by the inclined edges of the notch in plate *16* until it rests on the edge *1*, when it is under pressure from one of the springs *20*, and as it goes a little further the spring shoots it down against the gong and into the till.

753,466—Disinfecting attachment for telephone. C. Bravi-Bertini.

If the microbes that haunt transmitter mouthpieces should see this patent they would exclaim with King James, "Hoot, mon, they're at me again." This inventor puts a double acting valve *g* on top of the telephone ringer box, connects it by a tube *h* to a spray ring *i* in the transmitter mouthpiece, and by a tube *f* to a tank *e* containing disinfecting fluid under pressure. The valve stem g^2 is reciprocated through a bell-crank lever *k* connected by a rod k^3 to the switch-hook lever k^4, so that every time the hook goes up or down the mouthpiece is sprayed.

One feature that recommends this invention is that the spray ring might easily be adjusted so as to disinfect some of the people who use the telephone. Apart from this, however, the idea is really well conceived.

753,493—Telephone. S. C. Houghton.

Both the illustration and description in this patent are below the average. The invention is of some importance, however, by reason of the claims based upon it. It consists of a switch mounted on and operated by a receiver support, and an electromagnet connected so that if the subscriber leaves his circuit closed after using the instrument current may be sent from central to restore the switch to normal position. Without expressing any opinion as to the validity of the claims, I may say that on its face claim *l* covers any means for disconnecting the substation circuit from the line-circuit and thereby restoring the line to normal.

In the figure herewith *1* is a box carried on the transmitter arm by the vertical rod *3*. Pivoted in this box is the extension arm *4* having the receiver swivelled at its extremity so that it can be turned to be used for either ear. This arm turns about over a plate *1b*, which has depressions in it around the edge, and in the arm is a vertical spring-pressed pin or latch, which slips into these depressions as the arm is turned, but can be withdrawn by the magnet *13*. As the arm *4* turns either way, it cuts in the magnet at springs *21-22*, and completes the talking circuit through other similar springs behind these. If the arm is left latched to one side an impulse from central will energize the magnet to lift the latch, and the contact spring acting upon opposite sides of the arm *4* will turn it into a middle position.

753,562—Jack field for telpehones. L. M. Ericsson.

This is Mr. Lars Magnus Ericsson, assignor to Aktiebolaget L. M. Ericsson & Co. of Stockholm.

The invention consists in a means for mounting jack strips in a switchboard frame. In the figure, *7* corresponds to the vertical stile or supporting member in the standard type of board. Each strip of jacks is mounted on a metal plate *1* carrying front and back strips of insulation *3* and *5* respectively, in which the thimbles and springs of the jacks are supported. The ends of the metal plate *1* slide into grooves *8* in the vertical stiles *7*, and when they are all in place (being inserted from the front) vertical strips *11* cover the joints and are secured by screws *12*.

753,563—Portable or table telephone instrument. L. M. Ericsson.

This is another invention belonging to the Swedish Company and relating to a type of instrument not much known or used in this country, although very widely used abroad. A combination telephone transmitter and receiver for desk purposes, instead of being hung up on a hook when not in use, is supported in a cradle carried on a four-footed stand, the cradle being mounted on a vertical plunger *9* passing down through the central hub of the stand into a box *7* enclosing the contact springs *20*, *22*, *23*, which control the talking and signaling circuits. When the instrument is in the cradle the plunger goes down, and vice versa.

753,903—Toll apparatus for telephone exchanges. F. R. McBerty.

The circuits here shown are standard relay circuits of the Bell company, the usual bridged common battery, series supervisory relays controlling shunts around the lamps in a third cord-conductor closed in a local circuit *3-6* with the cut-off relay when a plug is inserted, being employed. In parallel with each cut-off relay is a register magnet *C*, requiring current from generator *g* to operate it. This generator may be cut on to the answering plug by the operator's key *k*, working the register over the following circuits: *g*, *k*, *6*, *b3*, *3*, *C* and earth. But this key is normally locked by the armature *m'* of the magnet *m*, having two windings, one *m2* in the shunt circuit *9* of the lamp *f'*, and the other in the circuit *10*, which is an extension of the same. The circuits *7*, *9*, *10* and lamp *f'*, with magnet *m*, are all on the calling end of the cord. When the called subscriber answers, the relay *f* pulls up and shunts the lamp *f'*, closing the circuit thereby through winding *m2*, when the magnet *m* pulls up its armature *m'* to unlock the key *k*, which can thus only be operated to register against the calling subscriber after the called subscriber has answered. When the armature *m'* is once up it stays up, closing its own circuit through winding *m3*. This patent is assigned to the Western Electric Company.

753,918—Polarized relay. M. C. Rorty.

This is a relay of the type now commonly employed in common battery work, but polarized. The magnet *S* has the usual core *a* and bent core extension of soft iron *b*, and is overlaid by a permanent magnet *M* upon which is laid the bell-crank armature *H*, secured by the pin *t*, with its upper arm lying under the contact-springs at *f*, and its lower arm lying between the core *a* and the iron extension p^2. h^3-h^4 are stop pins of copper to prevent sticking. This patent belongs to the American Bell.

753,927—Switching apparatus for telephone exchanges. E. H. Smythe.

This invention, which is also assigned to the Western Electric Company, has for its purpose the disconnection of detrimental grounds from cord-circuits and trunks in making connection with the latter. In common battery automatic signal systems it is usual to ground one pole of the battery; and in any large exchange the battery is practically grounded in any case through the leakage and capacity of the united lines connected therewith. When connecting with trunk lines slightly out of balance and inductively affected by neighboring power of lighting circuits, the metallic circuits are made noisy and in many cases rendered useless for proper telephonic transmission. Hence the present disconnection of the grounds. The invention also comprises a system of terminal trunk signals.

In each cord-circuit *3, 4, 5, 6* of the subscriber's answering operator at station *A*, a relay *k* is provided connected in a third conductor *8* of the cord, leading from the sleeve *g2* of the calling plug *f'* to the supervisory lamp circuit *m'* and the battery *i*. Each subscriber's line has the test-thimbles of its jacks connected to ground through its cut-off relay, so that if the plug *f'* is used with a subscriber's jack the relay *k* gets current and pulls up its armatures, making the wire *10* continuous to battery *i*, and also putting the repeating coil windings *h2* and *h4* on the battery *i* as usual. The circuits are then the same as in all the standard Bell cord-circuits. On the other hand, the jack-thimbles of the trunks, such as *13-14*, have no ground connection, and if plug *f'* is used in a trunk jack *b'* the relay *k* remains inert, and the repeating coil windings *h2-h4* remain connected through wire *11* without any battery or grounds. Telephonic transmission is between windings *h'-h2* and *h3-h4* in any case.

At the *B* end of the trunk the trunk plug *f2* is connected through the supervisory relay *w* and the repeating coil windings *o2* and *o4* to the battery *q* as usual. The incoming trunk ends *13* and *14*, however, are normally connected through the repeating coil windings *o'-o3* and the supervisory relay *r* to the battery *q'*, which is grounded. Relay *p* is in the circuit *24* of the signal relay *x*, controlled by relay *w*. The called subscriber (connected to jack *b2*) controls the relay *w*, and hence the lamp *v* and the relay *p*. The relay *p* when excited cuts off battery *q'* and the grounds, completing the local circuit *18-19* for the relay *r*, keeping the disconnect lamp *u* dark. The trunk line is thus free from grounds during conversation, but the called subscriber controls the relay *l'* at station *a*, and the supervisory signals *m-m'* work uniformly for all connections. When both subscribers have hung up, and both lamps *m-m'* have lighted, the *A* operator, who supervises all connections, pulls out the plugs, and the trunk circuits resume the condition shown in the figure so that the lamp *u* lights as a trunk disconnect signal.

753,956—Relay. H. P. Clausen.

This is a combination relay having a single armature *12* pivoted at *13* in the brass frame *10* and adapted to be controlled by either or both of the magnets *4*, which have iron shells and a connecting yoke *8*, so that they can be used separately or together. The relay has its armature provided with a flat spring *24* riveted at the middle, extending out at the bottom and clamped on a post *29* to form a retracting spring, and lying flat along the armature from the middle point up, its upper end covering a hole in the armature through which projects the point *23* of the contact pin or post *19*. When the armature is attracted the spring is left at the post, and when the current is cut off it helps to pull back the armature and prevent sticking.

The contacts are made between two uprights *17* and *18* of the yoke *14*, and a "U" shaped cover is made to fit down over the yoke to exclude dust or moisture.

754,011—Commutator for telephonic or other circuits. C. H. Prott.

This is an invention by a German gentleman residing at Rheydt, in the province of Rhenish-Prussia. The apparatus is comparatively simple, the illustration and description are quite involved enough to suit the labored Teutonic mind. The invention comprises a party-line system with a special switch at each station, and incidentally a few special circuits therefor, for cutting out all intermediate stations and preventing listening in during use of the lines. The patentee says: "Its utility in electric lighting systems, railway signaling systems, and elsewhere will be equally manifest." In Fig. *4*, herewith, the successive substations of a telephonic system having a central station (not shown) are indicated by *I, II, III, IV*, each having a commutator and telephone. The main wire *a* passes to all the stations and is divided up into sections at their switches. A ground wire *b* is also carried around, as well as a series of "house wires," all connected to each of the plug and jack switches *k*. The special commutator in each case is shown above, and in detail in Fig. 6.

Each commutator cam has three positions, and is provided with a handle on the front of the box. The cam is normally thrown into an inoperative position to the right, but when the line is in use the armature *45* is in position to engage the tooth *49* of any switch to lock it against setting. The magnet is at the same time connected so that when the line becomes free all cams are unlocked and returned to normal position, as shown in Fig. 4, each ringing a bell at the same time as an indication.

The object being to interconnect the local and line circuits, and the springs surrounding the cam being connected as shown in the figures, the first position leaves all parts normal as stated, the second position connects up the local telephone and the central station line, and the third position connects over the "house wires," selection being made by the appropriate plug switch.

754,041—Telephone attachment. J. Blum.

This invention speaks for itself. It is intended to keep the filthy from touching the mouthpiece. Mr. Blum names as some of the obnoxious deposits which are thus prevented, tuberculosis germs, the secretion of eczema, the secretions of carious teeth, and those due to many diseases of the mouth. After reading this list most people would be afraid to touch even the projections on the preventer. However, they are of metal and therefore sanitary.

754,057—Antiseptic attachment for telephone mouthpieces. W. M. English and A. H. Ten Broeck.

From all parts of this broad land arise protests against dirt and microbes. It seems to be that the number of these antiseptic appliances is somewhat indicative to the extent to which the telephone habit is taking hold on our people. While most of the inventors are men, the passion for cleanliness in furniture and appliances is largely traceable to the American housewife. I believe the first attempt at disinfecting a telephone was that made by the housemaid who once poured boiling water in one of Keelyn's transmitters in the early days. (I will add that after it was thoroughly

baked it talked, but only in a violent and profane tone.) The present inventors hail from San Francisco, and we shall expect to hear later from Honolulu or Manila.

The present invention consists of a conoidal shell *2*, carrying absorbent cotton *4* within its curled edge *3*, and secured in place by tongues *5* bent over the edge of the mouthpiece *1* and around a ring *6*. A feed opening *8* for the liquid antiseptic and a drainage opening *9* are provided in the edge.

754,211—Telephone or telegraph system. T. W. Gleason and R. Hamilton.

This is a step-by-step selective party-line system. Such systems are of two types, those in which normally-wound clockwork switches are employed, released step-by-step by magnets, and those in which the magnets themselves do the work of stepping around the switch arms, pins or cams that close the local circuits. The present invention is of the same type. It has very carefully developed apparatus and the six sheets of drawings are evidently made from working models. The description is clear, but difficult to condense, and it extends to nearly seven thousand words.

The invention consists in brief in the use of electromagnetic step-by-step motors of the anchor escapement type, which step around star wheels on shafts carrying selecting cams, each of which is set at a different angular position. Each station has a make and break wheel with a double set of contact teeth and double circuit connections, and at each station on the same shaft is a setting knob and indicating dial. Each talking circuit has a normally open series switch and a normally closed shunt switch, *31* and *23*, respectively. Each has a pair of polarized magnets *41-42*, which move an armature *35* to close the contacts *53* in order to maintain the talking circuit intact at the calling station, this being necessary because at all stations except the one called the selective cams have opened the circuits. At each station a relay *d6* is cut in when the hook *H* is down, and can be operated by current too weak to work the stepping magnets *1*, so that it may close the local circuit *d12* and ring the bell *d*. This ringing is done by the key *d3* cutting in resistance *dx* to weaken the current after selection is made.

At the end of the conversation the receivers are hung up and impulses are sent alternately from one side and the other of the circuit wheel, restoring all the switches to zero.

754,224—Telephone repeater and system. S. P. Levenberg.

This is a telephone repeater of somewhat novel construction and having its connections a little out of the ordinary. In the block *1* is imbedded a magnet *3*, carrying coils *4*, and working the diaphragm *16*, which is mounted on the rubber ring *7*, in which the iron ring *10* is secured with bent over ends, one of which *11* drops down into a cavity and is secured to the front electrode of a microphone *A*. The microphone and the primary of its induction coil are bridged across the circuit, and the receiver coils *4* are bridged in shunt thereof. As the magnet vibrates the diaphragm the entire ring *7* swings.

754,457—Telephone relay or repeater. I. Kitsee.

This is a galvanometer-repeater. The needles *D* are pivoted within the coil *B'*, and the variations in current tend to oscillate them on their pivot *c*. Their motions are communicated through extension arm *F* to "U" shaped contact *f-f'* dipping into cups *g*, which are preferably filled with dilute sulphuric acid, constituting what Dr. Kitsee calls "Michrophonic" material. Each pair of cups is included in a local circuit, with a battery and the primary of an induction coil, the secondaries of which are to line.

754,556—Telephone receiver support. H. L. Goodwin.

This is a supplementary receiver hook for attachment to a transmitter support, a desk or the like. The receiver has to be laid down in many cases while the telephone is in use, and it happens often to be on a slanting surface, like a bookkeeper's desk. With this supplementary hook it can be hung up conveniently without disturbing the circuits.

754,646—Antiseptic telephone mouthpiece. W. M. English and A. H. Ten Broeck.

Another invention of our friends from California. The mouthpiece *1* is itself made with a dependent cup *3* containing the antiseptic material and covered by a screen *4*, which is shown as a perforated sheet, but may be of wire gauze.

If everyone was as much in earnest as the inventors seem to be, consumption ought to be stamped out in this country.

754,884—Cable clip—James McFarlane.

This is a band clip, which needs no description.

754,935—Ringing and listening key. C. H. North.

This is a ringing and listening key of the vertical frame type, with oscillating handle on a rotating disc, lying in a slot in the escutcheon or table plate. The parts are enclosed in a box frame *a*, at the bottom of which is secured a channelled insulating block *g*, in which the shouldered or notched springs *1-2-3-4-5-6*, with interposed insulating slips, are confined by a second block. The operating handle is mounted on the disk *e*, turning on a transverse pin and carrying the opposite rollers *f-f*, which are kept in position on their studs by the sides of the box *a*.

The operation of the key is apparent from the illustration.

BELL LINES USED—ONCE.

The Bell company, in an advertisement in a Buffalo paper, called attention to the fact that its lines were used by the Rochester officials in summoning assistance from Buffalo during the recent Rochester fire. The following from the Buffalo Express of February 2 touches on this, and is of interest as showing the value of Independent vs. Bell service between the two cities:

Our attention has been called to an advertisement, by the Bell company, in The Express of February 27, under the caption, "Turned to Bell Company's Lines," laying stress on the fact that during the progress of the Rochester fire one call was made at Rochester, for Buffalo, over Bell lines and delivered promptly.

For the last nine months we have enjoyed an ever-increasing volume of business between these two cities and had concluded, from the amount of it, that we were getting about all there was of it. We are, therefore, somewhat surprised at the statement, in the paid advertisement of the Bell company, that they actually did have a message on this particular day. We have no knowledge of this message and will neither affirm nor deny this startling statement.

We do know, however, of a very important message that a representative at Rochester of an evening Buffalo paper tried for one hour and forty-five minutes to put over the lines of the Bell company to his Buffalo office. After waiting this time, he transferred his call to the lines of the Inter Ocean Telephone and Telegraph Company, who promptly delivered the message, through the Frontier Telephone Company, the result being that this evening paper made arrangements which enabled it to give to its readers photographic views of the Rochester fire in its five-o'clock edition.

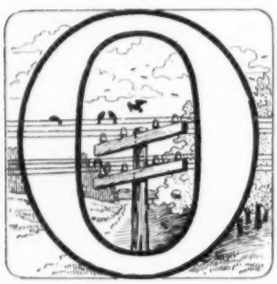
The Inter-Ocean Telephone and Telegraph Company handles hundreds of messages daily between Buffalo and Rochester, and was exceptionally busy during the Rochester fire, but in spite of this fact it put this very important message through for this local paper promptly.

The Bell company concluded its advertisement by stating that in an emergency their lines are always to be depended upon. We take exception to that statement, as does also the man who waited one hour and forty-five minutes for Bell connection with Buffalo and then did not get it, and many others who have had similar experience.

Taking it all in all, we wish to commend the enterprise of the Bell company in so promptly and prominently notifying the public that it actually did put through one message from Rochester to Buffalo on the morning of February 26. This performance must certainly be exceptional or the Bell company would not have found it necessary so promptly to herald it in so prominent a paid advertisement.

Telephone Convention Papers

LOYALTY TO THE PRINCIPLES OF THE ASSOCIATION.



N hearing the results of the battle of Bunker Hill and learning with what bravery our heroic ancestors on that occasion faced the ranks of the British until then considered by the world as almost invincible, Washington is said to have declared that the liberties of the country were safe. Their intrepidity in battle, their willingness to endure hardships, their continued adherence to their country's cause through eight long years of strife demonstrated the truth of Washington's declaration so far as fighting qualities could demonstrate that the liberties of the country were safe.

But later historians do not now consider that the times of the revolution were the critical times in our early history. It is now believed that King George and his hired Hessians was not the worst enemy of the young republic, nor yet the Red Men with all the plunder and pillage of which they were guilty. The greatest obstacle to their progress, the rock upon which they came nearest suffering shipwreck was their lack of united action, their failure to co-operate with each other, their fear of themselves. Separately the two or three million human beings occupying our eastern border were thirteen feeble colonies neither feared nor respectd by any. United they were a nation of such strength and vigor that they commanded the respect and admiration of the world.

In view of these and other facts in our own national history it ought not to be necessary for any one to come before this body of intelligent business men and plead for greater loyalty to the principles of this association. It ought not to be necessary, but unfortunately it is necessary. With so many telephones unrepresented here to-day, with so little co-operation among those that are represented and less among those that are not, with the increasing demand all over the state for telephones and the increasing necessity for capital to supply this demand, we ought not to be obliged to come here and take time to discuss loyalty to the principles of the association.

We must have co-operation and arbitration or—Carrie Nation. We might just as well face this solemn fact. It will not be very long as the years go by until any man of sufficient vitality to prevent decomposition, can sit in his house or office and get himself into conversation with any other man similarly placed in the state of Iowa and not be very many minutes about it either. We are not living in the 16th century. It formerly took six months to get across the country, but the invention of the locomotive made it possible to do the same in less than as many days. The invention of the telephone has made it possible to so arrange matters at a reasonable cost as to enable men to do as I have said, and they are going to demand that it be so. Any little seven by nine policy will not do. Somebody is going to do this work and whoever does it will reap the reward. We who are in the field must do it or we will be forced to step aside and let others with better notions of twentieth century ideals take our places; but it will be done.

The population of Iowa is reaching the two and one-half million point. When the point of saturation is reached there will be in the state in active service at the lowest calculation two hundred and fifty thousand telephones at a valuation of from ten to fifteen millions of dollars with a gross annual income running into the millions. The realization of these figures does not depend upon this association. It does not depend upon us individually. If this association should never have another meeting, if we should all go out of the telephone business to-morrow, it would come just the same. It is possible for the people to have the service at a cost within their reach and they are going to have it. And, moreover, they are going to have it when matters get down to the normal condition without having two or three telephones apiece that will not connect with each other.

The present condition of the telephone business might be properly described as embryonic or perhaps chaotic; possibly idiotic would be better. This condition will do for the transition stage, but not for the state of complete development. Either the Bell company must retire or the Independent must go to the wall or there must be some sort of a compromise so that by having one instrument I can sit in my house or office and talk to any man in the state who has a telephone and but one telephone. It remains therefore for the Independents to endeavor alone to complete the task already begun and in order to do it successfully we must work as a unit. To do this we must put an end to the miserable bickering and petty quarrels among ourselves. We must make an organized effort to establish toll lines in such a way as to cover the territory successfully and still not squander capital by building needless lines. We must work together in attempting to get the smaller, weaker and inexperienced companies to adopt better business methods, better construction and to give better service. And this should be so whether they are members of the association or not. We cannot play the dog in the manger policy. That has been tried and proved a failure, else we wouldn't be in existence to-day. We need a campaign of education rather than of exclusion. We must work together in assisting each other in getting into forbidden ground.

There are as yet but few cities in which the Independents have not gained a foothold, but as we in Western Iowa happen to know there is yet one or two places which we need very much, the assistance of the whole state is regarded as being necessary in getting them. With a live association back of us, however, we would soon win out.

We need to strengthen each other financially. Capital is needed in every part of the state to develop territory already occupied. Nothing would help this more than a knowledge on the part of capitalists that the whole state is supporting by its influence and co-operation every company in the state and that none will be allowed to fail.

There is much talk of a clearing house to look after the money that comes in. But just at present more than we need to look after the money that comes in do we need to look after the service that goes out. We need to strengthen the weak places, to fill up the gaps, to stand as a unit, and we will not need to worry about the other details.—*Paper read by H. A. Kinney, Woodbine, before the Iowa Independent Telephone Convention, Des Moines, March 9, 1904.*

SHALL WE ESTABLISH A CLEARING-HOUSE?

When my subject was assigned to me there seemed to be absolutely nothing from which to gather material for a paper. Gradually, however, one point after another has occurred to me and I shall endeavor to lay them before you. I will state, however, that everything pertaining to this question that is written by an Iowa man, must be largely theory, for we all know that there has been no school of experience from which we could learn actual lessons.

The difficulties of our present system of settling inter-line business, are so many and so varied that many companies have come to the conclusion that that threadbare system of "keep what you get" is perforce the best; still others check after a fashion and then split the difference on the balance, while a few, and a very few, doing business over a small number of lines, are able to accurately check all their business.

I have always thought that it was unwise to attack any system or principle until I had another and better one to offer. The search for a better system of checking has been constant among our members. Many of us have heard this matter talked in these conventions and still we are stumbling along in the same old way. I shall not attempt to say why; the kernel is that we are, and that we ought not to be. But enough of the past and present—what of the future?

Are we going to continue to follow the old way, or are we going to try to substitute a better system? Some other states have already formed a clearing-house for the settlement of their business and from reports, it has proven all that we could wish. These states do not begin to handle the volume of business that Iowa Independents do, and yet they are loud in the praises of their system of checking. If a clearing-house is successful in other states, are we going to let Iowa go lagging along behind?

Several of the representatives of the toll line operating companies held a meeting in this city some time ago, at which meeting it was my privilege to be present. There we met a Mr. Brookins of St. Paul, who is or was, in charge of the clearing house for the Independent toll line of the state of Minnesota. He very clearly stated to us the methods and processes used by it and made a favorable showing as to the cost of operation.

It was thought best that a definite step toward organizing a similar clearing-house in Iowa be deferred till this meeting in order that the entire membership might more fully enter into all of the necessary steps. The most feasible means of effecting an organization that presented itself was to form a stock company, in-

corporated under the laws of Iowa, the stock to be held by the companies desiring to participate in it, in equal amounts, one no more than another, regardless of size, directors and officers duly elected, to select a manager or executive head, who would assume the responsibility of the detail work. The cost of the office to be assessed again the members in exact proportion to the number of messages cleared, and any surplus to be divided in the same manner. We will all of us agree that the cost is the important factor in any deal of this kind. To be better any scheme must be more economical and efficient. We must not lose sight of the fact, however, that some adequate checking arrangements will without doubt turn many lost calls into paid calls and also will bring into the records many calls that are now slipped through by unscrupulous agents, etc. This increased revenue applied on the cost of operation of a clearing house would be very apt to throw the balance on the right side of the ledger.

The complete success of such a method will depend somewhat on the percentage of the companies that handle their business through its channels and every care should be taken to organize this company in such a manner as to induce the greatest number of companies to come in at the start. Then there will be little doubt that the others will follow. Here again our neighbors' experience must serve as our guide and I am advised that every connecting company in Minnesota now clears through the medium of the clearing-house, while at the start only a few of them were among its members.

So much for the inception of a clearing house and its initial field. What about its indirect advantages?

We have all heard uniformity preached ever since we can remember. We have heard papers, speeches, discussions on uniform construction, uniform rates, uniform service, uniform records and uniform methods, until I have come to believe that there was nothing uniform—not even our ideas as to what uniformity meant. But here we would have a uniform method of checking and settling accounts and what a short step it would be to a uniform system of keeping those accounts and of forms on which to keep those accounts. Here at least is a start on uniformity and you may carry the idea on for yourselves. Again, after an operator or agent has been brought sharply to time for the careless making of checks, etc., he will exercise greater care not to be again caught napping, and accuracy will come to our aid in reducing the cost and raising the efficiency of keeping our records.

It is thought by many that some of the existing methods of division of tolls are unjust and unfair. Granting this to be true, what a simpler method of righting these affairs than through the medium of a central clearing house that is in direct touch with all the parties affected?

My primary idea has been to furnish grounds for a good, lively discussion as to the clearing-house proposition in the various lights that it appears to the different hearers, and what few suggestions are contained in it come from the viewpoint of extreme simplicity, accuracy and economy, together with the fact that it would be an organization that would attract rather than repel the smaller companies without which our movement fails of complete success.

I trust that the discussion may lead to results of the greatest benefit to the Independents of the Hawkeye State.—*Paper read by J. M. Plaister, Fort Dodge, before the Iowa Independent Telephone Convention, Des Moines, March 9, 1904.*

OUR EXPERIENCE WITH FARM TELEPHONES.

To me has been given that delightful subject, "Our Experiences with Farm Telephone." Judging from the stories that have reached me from various sources about experiences on rural lines, I am surprised that I should be chosen from among so many whom, it would appear, are better qualified to give their experiences, for I have no knowledge of anybody on our lines who fastened the receiver to the rocking chair in order to hear what passed over the line. Still I do not wish to claim in connection with this, that our lines are not troubled with that pernicious chronic rubberer, for we have people who are so curious that if they hear a night call for the doctor at 12 o'clock, they will get up and go to the telephone and say, "Who's sick?" We also know that we have people on our lines who have their telephones put in for no other purpose than to keep posted on the events of the day and week; and so the aim of this paper will be to try and arrive at some conclusion whereby we can get rid of this "Rubberer" forever. In presenting this paper to you, I have thought it would be well to give you the length of time that our company has been operating, the number of rural lines now installed, the average length of the lines and the average number of telephones per line. This will help you to form some idea of where we have secured our experience. Our company, in its early days, commenced building country lines somewhere about 1895. There was only a gradual growth until 1898. The first lines, of course, that were built were the grounded series lines, followed by the metallic series lines, which were in turn followed by the grounded bridged and metallic bridged lines. At the present time the country lines are equipped with bridged instruments of not less than 1,600 ohms and for the Oceana division 2,000 ohms. The old lines are being made metallic as fast as we can rebuild. We have fifty-one rural lines leading from our exchanges with an average of twelve and one-quarter miles per line, and an average of eleven and one-half telephones per line, making not quite one telephone per mile, and our longest line at the present time is thirty-two miles, with twenty-seven telephones installed. We realize the fact that some of our lines are loaded, but we have two reasons for our lines being in this loaded condition, the first reason is that the demand for telephones had been so much ahead of our ability to take care of them that we had to put in new telephones on our old lines, even if they were loaded, and bear in mind we call a line loaded when we have from eighteen to thirty telephones on it. The second reason is the fact that in order to make money on a good metallic line in the country of, say, twelve miles in length, and you will notice that our lines average twelve and one-quarter miles, you have to have a good many telephones on that line, with the prices we are getting, to make it pay. Bear in mind also that what you realize out of any one line from an exchange is not entirely a net gain on that line, from the fact that every added line in the country adds that much more to the operating expenses of the exchange.

Our prices for rural telephones at the present time on lines that are already established are $15 the first year, payable in advance, and $12 per year payable quarterly in advance after the first year. We wish you to notice here that we give the privilege of talking anywhere in the county for this price. We also give to our country telephones the weather report every day excepting Sundays and legal holidays, and we find that the earnestness with which this report is looked forward to and the value that is placed on it every day is such that we would not dispense with it for twice the trouble it costs us. To return to our loaded condition, we wish to say that while some of our lines are considered to be loaded we have had it demonstrated to our satisfaction that we can ring on twenty-five and thirty miles of line twenty-five and thirty telephones satisfactorily, provided we can keep the "rubberer" that I have spoken about before, off the line, and we cannot ring on a line that has only six, eight or ten on the line unless we have that same proviso. In the ordinary party lines that we have been talking about it is impossible to locate the rubberer, for he is worse than a flea when you try to put your hand on him. For this reason and for the reason that our farmers expect to be able to talk from their telephones, although they may be twenty-five miles from a central, to points all over the state just as well as though they were living in the city or village, we have come to the conclusion that the only proper thing to do in the future when building country lines is to build a number one metallic toll line and some style of line where you have the same control of it as you had in the village or city exchange. I use the word toll so as to impress the fact that farmers' lines want to be built just as though they were toll lines, and as we realize that no company can afford at the present price to give copper service on the farmers' lines, we are inclined very strictly toward the use of No. 10 or even No. 9 BB iron wire for the country lines, although up until the present time we have used No. 12. It happened that in the earlier stages of the company's development there were three of the country lines built with No. 9 wire and the fact that they have caused less trouble in breaking and have talked better than the other lines has helped us to come to this conclusion. Following along this idea of control of the line it will be impossible either for them to rubber or to ring in, and otherwise spoil the service. With this end in view we have installed on two of our lines the lockout system. These lines were installed in July, 1903, and one line especially has been used as a test line, so to speak. It is a line of some fourteen miles in length and we have on that line eighteen telephones at the present time. The line, of course, is metallic of No. 12 BB wire. This line is equipped with double the number of telephones that the manufacturers ever expected would be used on so long a line, and it has proven to our satisfaction that should we have a line of from six to eight miles in length of No. 12 iron wire or of fourteen miles of No. 10 copper, we could handle eighteen telephones on the line with perfect satisfaction to everybody. This line that I speak about talks as though it was copper with nobody else on it.

Our experience with these farm lines has led us to the conclusion, and the resolution is now before the board of directors for action, that we will build no more lines from any exchange unless we build for the lockout system and charge accordingly.

Further regarding this lockout system, the control that we have had on the line, even in the condition that we have been using it, and the utter absence of the rubberer, has made us possibly more enthusiastic along this line than we otherwise would be. What success that the present automatic service is having in Grand Rapids with regard to privacy and clearness and distinctness of speech, the same can be said of the lockout system. What more do you want?

Now we, as a company, feel the value and benefit of the farmers' lines. No small exchange can prosper unless it has the outlying country and villages connected. Therefore, for our own life, we are dependent on the farmers' lines, so to speak. This does not apply to cities, of course, and still what would the Independent sys-

tem be to-day without its thousands of rural telephones that are in touch with almost every point in the state? If they are not in touch they should be, and that is something along the line in which we are trying to bring forth from our past experiences in rural lines the fact that we must build our rural lines like the toll lines.

One of the easiest ways to build an exchange in a small town is to first build three or four country lines and run them into town. The more you add onto your country lines, the more demand is made on the business men in the town and the first thing you know you have a demand for a good-sized exchange in that village, where possibly before you could not get even one contract. In order to show you a strong inducement to build the farm lines like toll lines, we will quote from our annual report the tolls received in our Oceana division from farm telephones alone. We received $640.47 in tolls.

Notwithstanding all the kicks and the trouble that has come to us from our party lines and our farmers' telephones under the present way of operating, we know that they are a blessing both to the farmers themselves and to the company, and in the future as the telephone business is developing, we expect to give them the same kind of service as we expect to give people in the cities and villages. Until that time we can only say, "Rubber on."—*Paper read by George S. Root, Hart, Mich., before the Michigan Independent Telephone Convention at Grand Rapids, February 24 and 25, 1904.*

OPERATING A TELEPHONE PLANT AS A SIDE LINE.

When traveling men carry a line of samples besides their regular goods, they call it a "side line." The side line is to increase their salaries, and if it fails to do this it is soon dropped. So with the side line of the banker, merchant or professional man—it should increase his salary or his profit. If it does not, it wastes his time, and it will not take the average man a long time to find it out and a still less time to set the side line aside entirely.

The subject assigned to me, if taken in a narrow sense, would admit of but little that is of interest to you. But when viewed from a broader standpoint, it is limited only by the experience of the one who speaks upon it. Necessarily, therefore, I shall confine my remarks to my personal experience in the telephone business as a side line.

First, I will give you a brief history of the Jefferson County Telephone Company, of which I am a charter member. Early in 1897, a few of our leading business men, under the direction of our lamented fellow citizen, and business associate, Henry Clay Raney, banded together and in May of that year formed and incorporated our company. Local conditions compelled this movement. Like our neighboring towns, we could expect little accommodation from the Bell company, who had but a small exchange of twenty-five or thirty, principally business telephones. Their annual rental was $36, a sum beyond reason and in many cases beyond reach of either the home or the business place.

Lacking knowledge or experience of plants equipped in similar sized towns, we figured conservatively that we might secure one hundred telephones, including both business and residence. One year later we increased our capital and built a full metallic toll line, connecting fifteen of the small towns in our county and also connecting Washington on the north, Mt. Pleasant on the east, Keosauqua on the south and Ottumwa on the west. In 1902 we were compelled to give our farmers telephones, and gradually but surely the number of our patrons has increased so that we now have the healthy total of 500 and over in business and residence, and 300 farmer telephones, connected by thirty-two party lines within a radius of five, six and seven miles, covering every neighborhood surrounding Fairfield. We started like three-fourths and possibly seven-eighths of all the Independent plants in Iowa were started—with the object to give our citizens good telephone service at a reasonable price. I am pleased to say we have succeeded, as some twenty in the city and double that number in the country are always on the waiting list, and anxious to be added to our list of patrons. The side line in my case has proved profitable, though oftimes troublesome and annoying.

We have heard a great deal in papers read at state and interstate conventions, of consolidations, and that it is imperative and bound to come. This may be true of larger cities and long distance toll and trunk lines, but locally we claim that towns of similar size, as our own, can operate more successfully and economically, and obtain better results for the investors than larger and foreign corporations. The local company, the members of which, as a rule, engage in the business as a "side line," and generally are the substantial business men of the community, are in better position to operate successfully and economically than the outsider or foreign capitalist who engages in the business merely for what he can get out of it. This applies also to electric light and gas plants, water works, etc. The local telephone is a local business, just as the bank and the store are local business. There is no more in the argument that telephones can be operated cheaper by consolidation, than there is in the argument that the large dealer or department store man can buy his goods cheaper than the hundreds of smaller merchants in our towns who have first-class credit. We all obtain these concessions by prompt settlement of our bills and taking advantage of all possible cash discounts.

I know of no more pleasant occupation and at the same time no more profitable pastime than the management of a telephone business as a "side line" for men who have been confined to business indoors and need recreation and out-door occupation. Our great state of Iowa boasts of many plants well operated as a side line, and on good paying basis, all of which help in the support of my assertion.

But those who may intend to engage in this side line expecting to strike a bonanza or profitable piece of play work, will be disappointed. The many petty annoyances daily coming up, unfavorable weather, breaks, damages, unreliability of help, unceasing expenditures and ever increasing responsibility of the management, all tend to try the patience of the most even tempered, and often the "side line" seems rather more of a burden than a pleasure. But no matter what business a man may be engaged in, he will always find the up-hill and down-hill, the bright side and the dark side. Some farmer will come into my store and sing the praises of the telephone, and the next man will say it's a nuisance, a useless expense—he is the kicker you probably all have met. It is chronic with him and cannot be avoided.

I readily acknowledge that we have not yet reached the stage of perfection. We have made many mistakes and will continue to make them. Gladstone learned the rules of parliament by breaking them, by making mistakes. Yet he was one of the wisest men of the world. Telephone men in this one respect, then, are like Gladstone, ready to learn by any means, even to making mistakes.

And these gatherings are annually arranged that we may learn from one another's experiences and mistakes. One of the most pleasant features of operating a telephone as a "side line" has been the acquaintances formed in our Independent association meetings. It will always be a satisfaction and pleasure to me to think of the many men of sterling worth and character I have met in these meetings of the Iowa Telephone Association.—*Paper read by J. C. Thorne, Fairfield, before the Iowa Independent Telephone Convention, Des Moines, March 9, 1904.*

UNITED HOME TELEPHONES OF AMERICA.

If we would secure the full fruits of our hard-won victories and occupy the ever-broadening field, to which the beckoning hand of destiny invites us, every Independent telephone interest in America must be indissolubly united in legal bonds. Hitherto, we might be likened to a great mob, patient, shrewd, determined, irresistible, but still a mob, an insurrection if you will, the visible manifestation of a misused and dissatisfied public. We are united with bonds of friendship, of sympathy and of loyalty. Far be it from me to belittle the lofty sentiments that are well nigh universal in our ranks. In the years to come the history of the Independent telephone movement will chronicle unnumbered instances of men who kept faith in the face of offers beyond value and the threats of ruin, unselfish heroism, unique in the annals of commercial enterprise.

But these bonds are not negotiable and the fact remains that we are as a whole not fully organized. But someone points with pride to the success of this movement. It has succeeded beyond the dream of the enthusiast. But, although a mob can overrun and an insurrection may capture, yet, unless some sure and stable government swiftly follow, the power and confidence of yesterday will be the curse of to-morrow.

The era of insurrection is passing. The era of organization is upon us. How shall we meet it? Shall we consolidate into a billion-dollar corporation, exchange our stock for bonds and spend the remainder of our lives trying to convince ourselves that we have treated a generous public fairly? Shall we fasten a monarchy upon a public that believe themselves enfranchised? Shall we remove a galling yoke, but to press down two in its stead? Or shall we, reversing the natural order, give birth to a parent company, and as the Bell company, put up territory to the highest bidder and let the purchaser gather his taxes from a trusting public? What assurance have we, if we pursue this Roman policy, that some other Independent movement, ruthless Goth and Visigoth to monoply, may not re-enact the scenes of the last eight years?

But seriously, what kind of an organization do we need? Let us examine conditions. We start out to finance a telephone company and meet one of the weak spots in unorganized conditions. We offer our securities to a prospective purchaser. We present a statement of our probable net earnings. He is satisfied. He inquires of us the effect on our securities of a sale to hostile interests, of neighboring exchanges and toll lines and all our assurance of faith in the integrity of our neighbor does not effect a sale of the bonds. The same results follow an investigation of our relations with the manufacturer.

I repeat. Every Independent telephone interest in America must be indissolubly united in legal bonds.

Let us examine further. Because a fellow-citizen is more easily approached for reasonable complaint than is a foreigner; because servants work more faithfully for a master than for another servant

and the relation is more pleasant and because of a local pride, a home company will give better satisfaction to its subscribers locally than will a foreign company. Satisfaction to the subscriber is the sine quo non of the telephone business.

Because home management can secure labor and right of way most economically; because home management is not so liable to damage suits and unjust taxation and because home management stands near to the city councils, a home company gives satisfaction to its stockholders.

Because of all these facts whatever organization we adopt must retain the features of home ownership and management.

But when we have given our subscriber a good local service, we have satisfied only a part of his demands. He must have good service with his neighboring towns and cities and with his nearest large city. Telephone companies form themselves in natural groups about these larger cities as centers, and the business done by a company in the group with a company outside the group is rare. For this reason it seems expedient that these groups should first be organized when the group organizations should be organized into a greater organization, which I shall christen "The United Home Telephones of America."

We have five cardinal principles of organization. 1—The impossibility of a wilful sale to a hostile interest or of a contract with that interest, unless expedient to the entire Independent interests. 2—The retention of home ownership and local management. 3—A lesser organization, including companies most closely related in business ties and a greater organization which will take care of the greater toll business which is not confined to any group, and makes of the entire organization one homogenous whole. 4—A system of representation in the organization which will neither allow the jealousy of the small stockholder nor the greed of the large stockholder undue power. 5—Effective with a small membership and yet capable as necessity demands of being extended over all America. In view of these facts and others which may appear as we proceed I wish to call your attention to a plan organizing all toll lines and exchange operating companies. This being effected the proper legal bonds with manufacturers may be easily arranged.

The group organization which I shall christen "The United Home Telephones of —— District," should accept only such members as are not engaged in any contract which would be denied them as members. Members should be required to bind themselves to neither sell to nor enter into contract with any telephone person, other than a member of the United Home Telephones of America. The compulsory powers of the organization should be in a body of delegates, sitting in a lower and an upper council. Each company should be represented by a delegate, sitting in both councils. In the upper council he should have a single vote, while in the lower council his vote should be in proportion to the assessed value of the property belonging to the company which he represents. This body should levy necessary taxes, the limit being fixed. The tax levy should originate in the upper council. This body should elect a president to administer affairs in vacation. No money should be paid out except by vote of the council. A referee should be elected, who would settle all controversies between members.

All district organizations should be members of the United Home Telephones of America. Its powers should be vested in a body of delegates, one from each district. Sitting in the higher council he should have a single vote, while in the lower council he should have a vote equal to the entire vote in the lower council of his district organization. This body should levy necessary taxes, a limit being fixed. No money should be disbursed except by vote of the council. A president and vice president should be elected by the council. A referee should be elected who would settle all controversies that might arise between district organizations or between members of different district organizations. The president should appoint with the consent of the upper council, an advisory board, consisting of a director of board of trade, director of patents, director of tolls and such others as may from time to time be advisable. The director of board of trade should arrange a place for the sale of stock and bonds of member companies. The director of patents should look after patents, to see that members are not taking liability in infringements and also to buy any new patents of advantage. The director of tolls should establish a clearance house to adjust tolls on messages passing from one district to another. This organization should furnish at a small profit, to each member, metal plates, bearing the copyrighted trade mark, and the words "member of U. H. T.," which he shall be required to place on each telephone. This is a very rough outline, but I believe it will stand the test of each of our cardinal principles and adds the features of furnishing practical local and general methods of toll clearance and a crying need of the business, some place where a market may be built up for our securities.

I am not posing as the bogy man, but the fact remains that we are at the parting of the ways. Either we will procrastinate until discouragement and decay set in and this mob, as is the nature of mobs, will melt away and some future Wendling amusing a future audience on "Popular Delusions," will add to the "tulip craze" and the "South Sea Bubble" the crowning folly of them all, The Independent Telephone Movement of America; or, meeting the future half way, we will hold fast the territory we have gained, will grow and extend until we show the world that gigantic aggregate capital may be organized so that every dollar invested will have a fair and equal chance with every other dollar and that such a telephone organization will give the best satisfaction to its subscribers.—*Paper read by David Prewitt, Winchester, Ky., before the Ohio Independent Telephone Convention, Cincinnati, Ohio, Feb. 18, 1904.*

UNIFORMITY IN TOLL SERVICE AND RATES.

The subject is one of much importance to all of the Independent telephone companies and of especial importance to the companies operating toll lines. In my opinion, it is in the field of toll service, especially long distance service, that the Independent companies have yet to do battle with their competitor, the Bell company.

The battle in the local exchange service and the local toll service has been fought and the Independent companies have won a decided victory, but in the matter of long-distance service we have not yet been victorious, owing to a lack of properly constructed lines and an absence of uniformity of methods in handling this class of business.

The early history of all public service corporations, such as railroads, telegraph and express companies, is not materially different from the history of the Independent telephone companies of this state up to the present time. Until these companies had built their lines up to a connection with other companies engaged in a similar business, each maintained its own standard. Modern business methods was not long in demanding a uniformity of methods for handling an interchange of business after these companies had extended their lines to some common terminal point.

The Independent toll line companies have extended their lines until they reach practically all parts of the state and many points in adjoining states, but as yet we have no satisfactory system for the handling of an interchanged business. The necessity for some uniform system of handling this interchange of messages, which is constantly increasing, is painfully apparent to every man, considering it either from the point of service to our patrons, or from the point of an equitable division of the proceeds.

Up to this point I presume that no member of the convention will take any serious issue with any statement advanced, but in any further discussion of this matter I am not so sure that we can all agree. I assume that some suggestions as to how this desired uniformity shall be accomplished is within the scope of this subject.

The question now arises: How shall we accomplish uniformity in toll service and toll rates? And while the subject as assigned me by the program committee does not clearly include the division of the tolls, I will assume that it is within the scope of this subject.

As to the manner of how we shall accomplish uniformity from the point of service, the writer does not feel competent to say specifically how this may be accomplished, as the toll lines are now constructed and equipped, but generally speaking, this can only be accomplished by a standardization of construction and equipment. By standardization of construction I do not wish to say that all toll lines shall be built in identically the same manner. It is a matter to be largely determined by circumstances whether the line shall be constructed of twenty, twenty-five or even higher poles. The size of the tops and the number of poles to the mile, etc., are matters upon which good telephone engineers seem to differ in opinion. The main object to be accomplished by the pole line is to have a line so constructed that the cases of trouble will be reduced to a minimum. By standardization of equipment is not meant that all companies should use the same make of instrument, but rather that the lines should be equipped with instruments of uniform resistance. So long as each individual company continues to construct its lines and equip them without reference to the construction and equipment of connecting companies, no uniform or satisfactory interchange of toll business can be had. While the meetings of this association have done much to further the interests of the Independent telephone business of this state, I believe that the time has now arrived when the members of this association should do something more than to meet annually and "talk shop." In my opinion the members of this association should organize and incorporate a company for the purpose of assuming general control of this interchange toll business and settlements for the same. As to whether or not these settlements shall be made through a clearing-house is a matter that I do not wish here to discuss, as another member of this association has that subject assigned to him and can enlighten you much better than myself. As to the details of the organization and corporation of the proposed company, the members themselves can be depended upon to arrange them satisfactorily among themselves. I might state, however, that in my opinion ample protection should be afforded to the smaller telephone companies. Provisions ought to be made so that no combination of the larger companies could be made which would jeopardize the interests of the smaller concern.

A uniform system, or basis for the division of tolls collected on interchange messages, is the one feature of the Independent tele-

phone business that has been almost wholly neglected. I am aware that this association at some of its earlier meetings recommended a basis, the details of which are so well known to all of you that I need not here repeat them. Very few companies have paid any serious attention to it and the practice in this locality has heretofore been "get all you can and keep all you get," regardless of the rights of the other company. This is entirely unbusinesslike and so far as I am aware, is not practiced or tolerated in any other line of business.

The basis recommended by the association is not equitable in all cases, as it was founded upon percentages only, regardless of the distance which each company interested carried the message. After devoting some thought to this matter I am convinced that a division of tolls on interchange business cannot be equitably made except upon a mileage basis. As an illustration of lack of equity in the association basis, I need give only one example in which our company happens to be interested. The terminal of one of our toll lines is located about sixty miles distance from Des Moines. At this terminal we connect with another toll line company having a station six or eight miles distant.

A message originating at the station of this connecting company and terminating in Des Moines will use about sixty-five miles of line, our company furnishing twelve-thirteenths of this line as against the connecting company's one-thirteenth. Under the association basis we are entitled to but 40 per cent or two-fifths of the toll fee collected. This is a manifestly unfair proportion considering the amount of line mileage furnished by each company. I have no doubt but that other toll line companies have similar conditions in their systems. Instead of the association basis for the division of tolls on interchange business, I wish to suggest the following: First, that the originating company shall be allowed 25 per cent of the toll collected, which shall, however, in no case exceed 10 cents on any given message. Second, that the remainder of the toll collected be divided in proportion to the mileage furnished by each company interested, measured in an air line distance from the originating point to the point where the second company receives the message, and from this point in an air line to the point of destination. These are the two principles which I believe ought to be taken into account in a division of interchange toll business. The originating company should certainly be allowed a liberal amount for originating, collecting and reporting the business. There is one other matter which now occurs to me which should be considered, and that is the matter of terminal fee which we have to contend with in some instances—notably here at Des Moines. The amount of this terminal fee should be deducted from the amount of the toll message before any division is made upon the mileage basis.

I believe also that we should enforce the three-minute time limit for any one message. There is no question but what the Independent interests are being imposed upon by the public in this matter. As we are now organized there is no especial effort being made on the part of any one to enforce this time limit.—*Paper read by D. M. Griswold, Des Moines, before the Iowa Independent Telephone Convention, Des Moines, March 9, 1904.*

A CITY'S RELATION WITH RURAL LINES.

The development of the Independent telephone business in the past few years has been truly phenomenal. Doubtless its equal has never been seen in any branch of commercial business. Hundreds of exchanges have been built in every state in the Union, and some of them in the largest business centers of the country. Thousands of miles of toll lines have been constructed, and tens of thousands of telephones connected. This unprecedented growth and continued increase is very largely due to the fact that the Independent exchanges throughout the country have given the farmer and farm lines the attention they have so long deserved.

The policy of the Bell company has always been to ignore entirely the farming interests, or give them at a short distance from exchanges a very indifferent service at such exorbitant rates that but very few could afford telephone connection. It is just beginning to realize, however, when it is almost too late, the great mistake of this policy, and is now bending every effort to placate the farmers and induce them to connect with its lines. Various propositions are being made, most of them well known to you.

The Independent exchange manager early realized the necessity of connecting with the farming district and in this manner strengthening the exchange, increasing the revenue and utility of the service, and fortifying himself against any attacks that may come. The mutual interest existing between the town merchant and the farmer in all lines of trade made this connection a necessity. The farmer, as rapidly as possible, was furnished with service at a moderate rate, being connected by party lines direct to the exchange and given exchange service. The growth was naturally slow, as you are aware that the unthought of increase in all exchanges demanded almost the entire attention and capital of those interested.

The average American farmer is progressive. He, more than most other men, is a social being and in the progress and advancement of the present age, demands closer intercourse with his fellowmen. He is no longer satisfied with his weekly paper or magazine, but must be in close touch with the business world to enable him to take quick advantage of favorable markets, and dispose of produce before leaving home. The telephone brings him as it were into town. It enables him to reach his friends and physician without a moment's delay, and there are moments in the life of one isolated as the farmer is that makes a telephone connection with town of untold value.

The farmer finds the telephone a great labor and time saver. One member of the neighborhood household will make trips to town and return with supplies for them all; thus saving many a long drive and loss of valuable time. This arrangement is of particular value during the busy harvesting season.

Telephone service is found to be of great advantage both to the farmer and postal authorities when used in connection with free rural mail delivery. It is understood that efforts are being made to have the postoffice authorities telephone the farmers when they have important mail or special delivery letters, that they may be opened and read to the persons to whom they are addressed, if it is so desired. The daily weather reports are also of great value to the farming community, and are furnished on call by many exchanges, without expense to the farmer. On all farmer lines there are prearranged signals or general calls which bring everyone to the telephone in cases of urgent necessity, such as fires, floods, or trouble with tramps.

The farmers found the telephone of so great an advantage to themselves, both in a social and business way, that they were unwilling to wait for the lines that were somewhat slow in reaching them, and commenced the construction of farmer or mutual lines. Their construction work and connections were naturally crude and cheap; as cheap in fact as it was possible to make them, using small oak or tamarack poles, set long distances apart, without attention to guying and corners. The cheapest wire and instruments were purchased, and the single line so loaded down that it was practically out of the question to use it commercially. So great was their haste for telephone service that in some localities the barb wire fences surrounding the farms were used and considered all that was required. Switching stations were established in farm houses, and all went on merrily until the novelty had worn off, and the housewife began to tire of being called from her household duties to answer the telephone and spend from ten to fifteen minutes making a connection for some distant party whom she frequently did not know and in whom she had no interest. This crude beginning, however, was a great educator, and as a result the farmer is no longer satisfied with poor instruments and indifferent service, but demands the best. The single grounded lines are rapidly being replaced by metallic circuits; old instruments by new, and the farm switching stations are being discontinued and the lines carried to some central point, a switchboard installed and a switch tender employed.

There are two classes of farm service; those who desire connection directly with the farmers in their neighborhood, without city service except as toll, and those that care but little for the country, but want the advantage of the city exchange without the disadvantage of the toll serivce. The latter are generally those living within a few miles of the larger centers with which they do business. They care little for the country connection except with their nearer neighbors, whom they can easily reach, as they generally have a similar service. The latter is the one in which the exchange manager at the present moment should be the most interested.

It is of vital importance that we should at once extend our lines a few miles into the country in every direction from our exchange, and connect all the farmers within that distance with our switchboards, giving them as good service as we are giving our city subscribers. If you have a central energy exchange, give them the benefit. Connect your lines so that you may ring grounded through tip and sleeve, thus reducing the annoyance of the rings more than two-thirds. Ten-party central energy lines can in this manner be used with considerably less disturbance from the bells than the old style magneto four and five-party lines. An exchange so surrounded will have become almost impenetrable. Close connection with all rural lines is of the utmost importance to the city exchange. The merchants expect and demand such connection, and will patronize the company that best serves them in this particular line.

There is considerable talk of competition between the Independent companies and farmers' mutual lines. The only competition that we know of is to keep them from accepting some of the bright-colored agreements offered them by the Bell company. There is no question but that the farmer mutual companies are becoming a power in certain localities, but as a general proposition, they are true to the Independents, who made their existence possible.

The greatest difficulty with which we have to contend (and it is no worse for us than it is for the Bell) is the effort of the mutual companies to extend their lines from town to town, and switchboard to switchboard, over which they give free service. In some places toll lines have been paralleled with free lines. It is our purpose to connect with and serve these people, but they must not lose sight of

the fact that we are furnishing the best of city service in all of the larger towns, and have built and are building toll lines into the country in all directions, in order to give them connection with the cities, and that there must necessarily be a limit to free talk. It is impossible to furnish something for nothing, permanently.

We recognize the fact that these mutual lines are, a majority of them, poorly constructed and expensive to maintain. The careless work of one or two men in their building will affect the working of the entire system. The same is true in a general way of the switchboards, most of which have been installed by inexperienced men, and therefore the service cannot be good.

City service is paid for in dollars and cents. If it is not satisfactory to the subscriber, not what it should be, or if the troubles are not removed promptly, the subscriber can complain and demand better service or more prompt attention. Not so with the mutual line. Where it is the business of everybody to keep the line up and make repairs, nobody does it and as a result the lines are frequently out of order for days at a time. So that these people will soon begin to look for better service, and by the time the lines are worn out or ready to be rebuilt, the majority of the farmers will be ready and willing to have the service furnished by those in the telephone business who will construct good lines and furnish good service at a reasonable rate.

The farmer must be taught that, in order to give good service, a reasonable income and profit must be allowed. Toll lines built between towns must be respected. That their lines must end somewhere. Their management must be placed in the hands of some one conversant with the business and capable of handling it properly. The ideal condition of the farmers' mutual has not been reached, and will not be until some of the conditions suggested above have been brought about.

The switch tenders and some of the owners of mutual lines are demanding a percentage of the tolls for business passing to and from their lines. Whenever they have a clear, as they call it, between two towns or stations giving a good service in connection with your toll lines, they should receive a commission or fee for switching. It is your duty and that of every Independent manager to bind the farmers to you by bonds of friendship. Encourage their proper and sensible organizations. If necessary identify yourselves with them. Get their good will. Give them all the help possible by furnishing them with the knowledge you may have of the business. Induce them to build more satisfactory lines and thereby improve the service. By such treatment you will be able to make a closer exchange agreement with them. Give them a share of the tolls for a time, and you will find that the general expansion of the service will soon work to your advantage.

One of the greatest factors in the upbuilding of the Jackson exchange, I confidently believe to be the extended and almost complete connection with the farming community in Jackson and surrounding counties, where we can reach with good metallic circuit, almost every hamlet and cross-road.—*Paper read by H. A. Douglas, Jackson, before the Michigan Independent Telephone Association, at Grand Rapids, February 25, 1904.*

IS THERE ANYTHING NEW IN THE FARMER SITUATION?

Yes, there always is. Did you ever hear of a bunch of farmers that were all satisfied? They always want something new. You must handle them with care and at the same time never allow them to run your business. The newest thing at Center Point is that the Bell company has connected up with the farmers' free lines. The arrangements are that the Bell company puts on their transmitter and makes a charge of $2 a year, then the farmer can talk over their lines by paying the regular toll rate. The reason that the free line farmer will not connect with the Independent companies (so he says) is because we are a monopoly, then he will turn around and connect with the Bell company. It looks like a case of straining at a gnat and swallowing a camel. I believe that the farmer free line movement will in the end prove a benefit to the Independent companies for this reason. They are finding out that they cannot run a telephone system on air. My experience has been when you give them good service they are satisfied. The farm telephone has become an acknowledged necessity.

Several years ago we predicted that it would not be many years until every farm house of any consequence in the country would be connected with the towns by telephone. The farm telephone is one of the greatest conveniences ever constructed. After using it a while the farmer finds it indispensable, and his neighbor from observing its usefulness, comes to desire it. Thus the work of extending this class of telephone lines continues and it will be but a short time until every neighborhood will be within call. Man labors to-day as he never has labored before and through his energy the seven wonders of the world have been multiplied a thousand times. Our grandfathers talk to us of the way they worked in their younger days from sun to sun but the work of twelve hours was child's play, compared to the work a man does to-day in six. It was not that men were less industrious then than now, but the difference is due to the evolution of business methods. The very inventions which we call labor-savers increase our labor a hundred fold. These inventions save particular kinds of work, but they vastly increase the work of the world as a whole, because they increase the world's capacity for work, and taking advantage of this additional power the world presses farther and farther forward.

Fifty years ago a man of business would read for an hour his morning mail, all written in long-hand, and it took him all morning to reply in same manner. He handled twenty different subjects. To-day the business man takes an hour to read his sixty or seventy typewritten letters and in another hour dictates his replies. The man of yesterday had the time to devote to his tasks uninterrupted. To-day while you dictate important correspondence your telephone rings and in one minute you give a verbal decision which means the loss or gain of thousands of dollars. In every department of human endeavor these conditions exist. Instead of lightening the labor of man, inventions have increased the work of every individual. No man was ever obliged to strive so hard to reach success as the successful man of to-day. No man could ever secure and hold such magnificent rewards. Under such conditions the wear on every man is enormous; every nerve is strained, every faculty at the highest pitch to keep in front of the rush of events, to keep on top of the wave of progress. It is not in all cases because men have to, that they work so hard, or that they do so much. It is the very fact that a man has achieved a great measure of success that leads him on to greater achievements, spurs him on to higher endeavor and therefore to harder work.

The forces which have been active in bringing about these conditions have, however, co-operated to find the means of meeting them. If on the one hand we are forced by progress to harder work and a greater expenditure of energy, we are on the other hand provided with helps which enable us to meet these demands. Instead of climbing stairs we use an elevator. Our offices and homes are supplied with telephones, electric lights, steam heat and other conveniences.

What is true of the business man is true of the farmer. He has his riding plows, his binders, his steam thresher, his hay loaders, his rural free mail delivery, and last, but not least, his telephone, which is the greatest labor-saving device on the farm to-day.—*Paper read by F. E. Outing before the Northeastern Iowa Telephone Convention, Dubuque, Iowa, Feb. 9, 1904.*

BELL SERVICE IN WASHINGTON.

—Washington Star.

RIP VAN WINKLE CITIZEN—"AND THE COMPANY SAYS: 'THE TELEPHONE IS INSTANTANEOUS.'"

Government Maintenance of Telephones

F. S. BUCKINGHAM

The inhabitants of the United States cannot justly be charged with tardiness in entertaining new ideas. Unhampered by tradition we are always ready to enter new paths that promise a shorter or easier way to the goal. The country is therefore the paradise of the inventor. Neither can we be charged with want of comprehension when new ideas are presented. Diagrams are not called for. The federal government has not been remiss in caring for the nation's internal interests. Mistakes have been made, and more will be made. It has often moved too slow for the radical, and too fast for the conservative. It has, however, invariably done what it considered wisest and best for the well being of its people. It exists for that purpose. To encourage the development of the treasures of mine and soil; to foster the growth of wealth; to promote the intelligence of its citizens; to advance the country in all that means real progress as well as to protect it from without are its primary duties. In schemes that are known as "socialistic," it has usually kept the happy medium between grandmotherly legislation and stepmotherly neglect. It has prudently left to private and corporate enterprise the means of intercommunication. Yet not wholly so. It has been found that many schemes required to develop the country could not be left to private and corporate parties to carry out. It has spent millions of dollars on roads, rivers, harbors and canals. Millions more will be spent. Appropriations are annually made for such purposes. And if the ship-subsidy, as well as the Isthmian canal bill becomes law the world will have fresh cause to wonder at our enterprise and resources. We dare not stand still or we shall join the ranks of dying nations. If, therefore, the federal government should put and keep a free telephone in every house throughout the entire country it will be introducing no principle foreign to our laws, but be following precedents that work well and that have grown venerable with age.

States have a much longer list of free institutions. They are closer to the people. Free roads that have cost thousands of dollars to build and keep in repair, enable rich and poor alike to travel without toll. Turnpike gates belong to the dark ages. Free schools are expensive institutions. Even those pay. It certainly does not pay to have ignorant citizens. Ignorance breeds crime and crime is exceedingly costly. One billion dollars are now spent every year to prevent, detect and punish it. What it would cost if there were no schools cannot be computed. Roads and schools do not exhaust the free list. They are, however, to provide the means of intercommunication and intelligence. Civilized nations have these; barbarous nations have them not. The extent and efficiency of these institutions are the extent of a nation's advancement.

Why not leave, then, the states to individually provide free telephones each for itself? For very obvious reasons. We are one nation, whatever state we may be living in. The postoffice could not be run by each individual state. The interstate commerce laws provide that citizens of the United States shall be free to trade and travel everywhere within its bounds. A national free telephone will bring every citizen into instantaneous communication with every other citizen.

Who can tell what it will mean to the social and business life of the nation! We shall be living in a new world and go forward by leaps and bounds. Mount Shakespeare's Pegasus; exercise the most daring imagination; give rein to the most nimble and brilliant fancy, and still all will limp behind the cold facts. It will bring buyers and sellers into the best markets. It will bring employer and employe together. What time and money are lost because of ignorance of each other's needs? The farmer that unexpectedly wants a "hand," instead of having to go miles will be able to find whom he wants in a few minutes. The housekeeper, too, in the same way. In factory and store in case of accident or sickness the available man can quickly be found, and work and machinery go on. When disaster comes in our cities, the fireman, the doctor are on the scene in a few moments at the tap of a gong. Minutes often mean thousands of dollars and valuable lives. But in the country, house and barn must burn down, and the injured bleed to death, because it takes so long to summon aid. In the weather bureau service its advantages would be simply incalculable. On the most lonely ranch and farm the farmer could ascertain conditions within a radius of five hundred miles. In harvesting crops, in caring for stock, he can have timely notice of storms and blizzards. Two hours' warning would often turn the balance between profit and loss on the year's work. Is it too much to say that the cost of installation would be saved to the country the first year in this one particular? Whatever affects agriculture affects the whole nation, for the land is the ultimate source of all wealth. It will be bound to have considerable influence in arresting the flow of population from country to town. One reason why the farm does not hold and attract some men is because of the loneliness of farm life. When the farmer can visit with his friends without stepping out of his house this feeling of isolation will disappear to some extent. In social life it will work a vast revolution. The time and temper lost on useless journeys will be at an end. Appointments can then be made minutes or hours ahead. The dinner party, the social gathering, are now often marred because something happens at the last moment, and word cannot be conveyed that would save the disappointment. That, too, will be obviated. Separated friends will be able to learn of each other at all hours. In cases of sickness who has not known the agony of suspense, often bitter as the bitterness of death? The sleepless nights, the gloomy days, when one dear has been hovering on the brink of the grave? The rich do not suffer these horrors so much as the poor. They can travel and wire. The poor have to wait the slow process of the mails. Another great saving will be made, both of time and money, in correspondence. It is quite probable that three-fourths of letter-writing will then cease. When the mails are relieved of this enormous burden the postal authorities will be able to give us the loudly called for parcel post. With national free delivery added, the country will be in close and quick communication from end to end. These are but hints of the thousand and one benefits that will ensue.

Let those who look askance at this suggestion as being an outrageous piece of socialism do one thing before rejecting it—go through the transactions of the past year only, and figure out what they would have saved in time and money had this scheme been in existence!

But why not leave the spread of the telephone to private corporations? Corporations care for dividends and nothing

for the people, as such. We have no right to complain. Commercial concerns must be conducted on a commercial basis. And, further, the use of the telephone is now very restricted, and under existing conditions will continue to be so. How tantalizing it is not to find the name sought on the list of subscribers! If the telephone continues to be run on a commercial basis there will be millions of homes without it for a generation, or longer. Among the very poor five dollars per annum is a prohibitive rent.

The federal government in adopting the scheme will have this great advantage. It will have buildings ready to its hand all over the country, namely, the postoffices. It has also millions of acres of timber lands, where poles may be obtained at the cost of labor and carriage. Now is the time to do it. The finances of the country were never in better shape. The government can borrow all the money it needs, and at a cheaper rate than any other government on the face of the earth. The pineapple can be had for cost.

But as to patent rights and vested interests? Ah, there's the rub! Will the vested interests be ready to part with their "gold mines"? If the country should demand this great boon we may expect the vested interests will fight it like trojans. They will move heaven, earth, "the other place," and congress to defeat it. They will act as they always have acted. Confiscation of a just right is simply out of the question. Congress must and will, of course, deal fairly with them. Buy the stock, but first squeeze the water out. Vested interests must not be permitted to stand in the way of a nation's onward march. If their exclusive privileges had been alone considered the world would have made little progress. The interests of the people deserve some small consideration. When the bill was before parliament to construct the first steam railway in England, a deputation of stage-coach proprietors appeared, and demanded the bill should be thrown out, as it would ruin their vested interests. Parliament decided to let Stephenson's "Puffing Billy" run over them if they did not get out of the way. Hence railways.

In the reign of Charles II an enterprising citizen of London, William Dockway set up at great expense a penny post (two cents) which delivered letters and parcels six or eight times a day in the busy and crowded streets near the Exchange, and four times a day in the outskirts of the capital. This improvement was as usual strenuously resisted. The porters complained that their interests were attacked and tore down the placards in which the scheme was announced to the public. The utility of the enterprise was, however, so great and obvious that all opposition proved fruitless. As soon as it became clear that the speculation would be lucrative the Duke of York (afterwards James II) complained of it as an infraction of his monopoly, and the courts of law decided in his favor. As a consequence England was denied penny postage till Sir Rowland Hill advocated it, and it became law in 1840. We are not troubled with royal kings to block progress. But money kings will do it quite as effectually, unless they are closely watched.

As to the telegraph companies. Their occupation will be gone. It will go, and go soon, in any case. Why have a cumbersome system of dots and dashes that only experts can handle, and that takes months to learn, when we have an instrument that a six-year-old child can use perfectly? The telephone will kill the telegraph. Telegraphy will become a lost art, unless Marconi keeps it for the ocean and battlefield. A suggestion has recently been made in the public prints for the federal government to buy out the leading company. One hundred and fifty millions was mentioned as the price. Very good. Without a doubt they would be very glad to unload on anybody. The telegraph lines could be used for the telephone.

Recent discoveries and improvements have made the scheme possible from the scientific side. The other difficulties do not pass the wit of man to overcome. Wise and enlightened statesmen gather the stones out of the pathway of a nation's progress. There will be three questions for legislators to consider:

First—Is the scheme practicable?

Second—Will it be of great advantage to the country?

Third—Will it pay?

One measure of a nation's intelligence is: Does it avail itself of improved methods? It is not spread-eagleism to say we are in the very front rank of any people on the face of the earth in all that means enlightened advancement. The storied past has no brighter page to present to the student of universal history than ours. The last page of our record has not yet been written. What we have been we still shall be. The virile, brainy race that has produced Howe, McCormick, Field and Edison will yet produce others. We shall still have philosophers that will patiently woo other great secrets from nature, and whose broad generalizations will make their discoveries available for the service of man. The chemist and physicist will still continue to lay the fruits of their genius and toil at the feet of the sovereign people, who will not be slow to reward their benefactors, nor neglect to avail themselves of the results of their industry.

The telephone is a mighty instrument of advancement ready to our hand. We ought not to leave all its possibilities to our grandchildren. If we do they will have grounds to say we invented a good thing, but did not know its full worth. The generation that has given civilization so many new resources has surely the best right to enjoy them. And by adopting this suggestion we shall be giving the world another object lesson in progress. And who will deny the possibility that eventually the whole world will be bound together by the magic wire, and every man be able to talk instantly to every other man upon the face of the entire globe!

UNDER CIVIL CONTROL.

The telegraph and telephone lines in Yucatan are now under civil control. They were constructed during the uprising of the Maya Indians to facilitate communication between the towns and cities held by the federal troops sent to quell the rebellion. The generals in command of the forces against the Mayas have had direct control of the lines.

Now that these telephones and telegraphs are no further needed for military purposes, it has been decided to transfer all these lines to the department of telegraphs, and the respective orders were issued recently by President Diaz through the department of war and navy. At the same time the department of telegraphs to appoint some one to receive the lines with all its appurtenances, and Jesus Bay, telegraph inspector, residing now in Yucatan, was named.

FACILITATES BUSINESS.

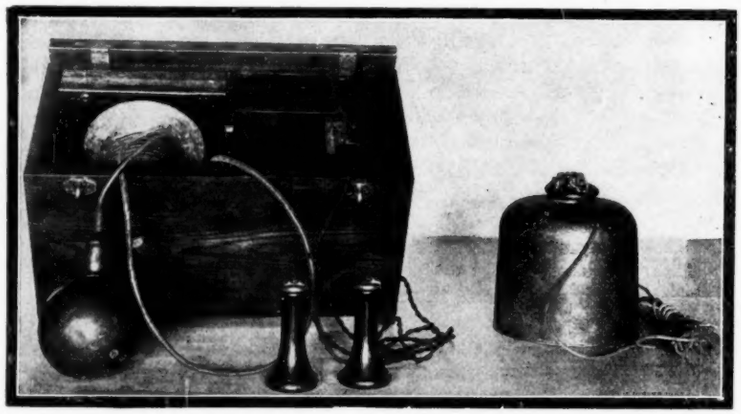
At the national convention of both the Republican and the Democratic parties the telephone has proved of great value in facilitating the transaction of business. At the St. Louis convention in 1896 Mr. Hanna had a branch telephone system installed that enabled the chairman of each delegation to immediately communicate with the presiding officials. Thus when a delegate in any part of the hall arose to speak his name was immediately conveyed by telephone to the chairman and recognition promptly given. This year it is proposed to install a more comprehensive system, placing telephones at all the entrances to the hall, at all the principal aisles, on the desks of the presiding officials and for the use of the chairman of the respective delegations.

We can't do business without TELEPHONY.—George W. Brown.

Submarine Sound Telegraphy

Next in importance to wireless electric telegraphy through the atmosphere is sound telegraphy through water, in the establishment of communication between steamers and ships at sea.

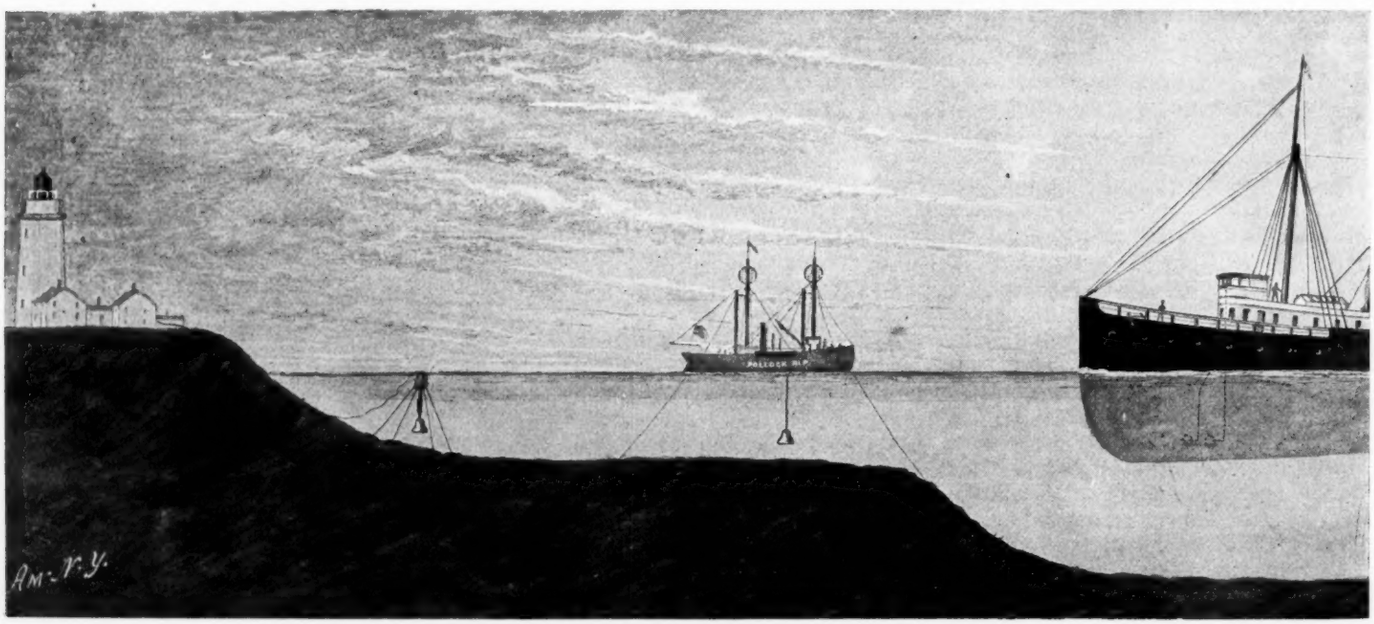
The accompanying illustrations show perfected apparatus for the transmission and reception of bell sound vibrations through the water from one vessel to another. In our issue of February 2, 1901, we described an experimental boat designed by Mr. A. J. Mundy, based on experiments in the conductivity of sound through liquids by Prof. Elisha Gray, which was successfully tested in Boston harbor. Since then several improvements have been made under the direction of Mr. J. B. Millet of Boston, vice-president and general manager of the Submarine Signal Company, which render the system quite complete and perfect from a practical point of view. Steamships plying between Boston and New York have been equipped with this improved apparatus, and successfully use it in signaling very frequently. Upon invitation one of the representatives of the *Scientific American*, on a very stormy and windy night (January 18 last), took the trip from New York to Boston for the purpose of witnessing the practical working of the system aboard the steamer "Herman Winter," and noted with much interest the distinctness with which signals were exchanged when the ship was seven miles distant from the ringing bell. It is a well-known fact that sound travels faster through water or liquids than air, and this is taken advantage of in a novel and practical way.



PORTABLE SUBMARINE SOUND SIGNALING APPARATUS.

Referring to the large illustration, the circular dotted lines shown in the larger vessel represent the position in the ship of the two sound receivers, one upon each side in the hold, located approximately twenty feet below the surface of the water. The lightship "Pollock Rip" has the sounding bell hung through a well in the center of the ship, about twenty-five feet below the bottom. It also has a receiving apparatus. Beyond, at the left, is observed a lighthouse and a buoy. Depending from the buoy is a bell, with a pipe leading to the shore to the compressed air reservoir in the lighthouse. In the small illustration the manner of suspending the bell is shown. It is held by a main chain, while a second operating chain is attached at its lower end to the bell crank of the hammer and the upper end to a pneumatic piston, which is operated by compressed air either from the anchored lightship or the lighthouse, as the case may be, or it may be operated by a direct upward pull by manual power if desired.

It has been ascertained that the receiver for collecting the sound vibrations need not be located on the outside of the vessel, but operates as well when clamped on the inside against the inner surface of the outer hull, especially in iron ships. The sound vibration from the bell passing through the water is communicated to the side of the ship's hull, and that in turn to the liquid or water in the receiver. This, as will be noticed in the illustration, consists of a cup-shaped metal cylinder having the open end edged with rubber and clamped against the side of the hull. Four hook-supporting arms project inward from the hull and upon these rest two crossbars in which are hook eyebolts, the hook portion being



SYSTEM OF SUBMARINE SOUND SIGNALING.

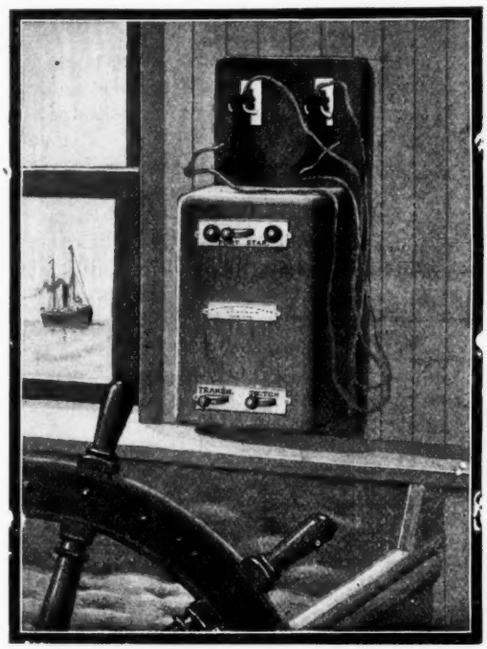
clamped over projections on the surface of the receiver. By this arrangement the open end of the receiver is clamped securely against the side of the ship's hull, making a water-tight joint.

Inserted in the top of the receiver is an electric transmitter, something on the order of a telephone transmitter, from which wires are run to the pilot house of the ship, as will be observed in one of the small illustrations. The wires are connected to a battery and the primary coil of an induction coil in the usual way and the telephone receivers to the secondary coil.

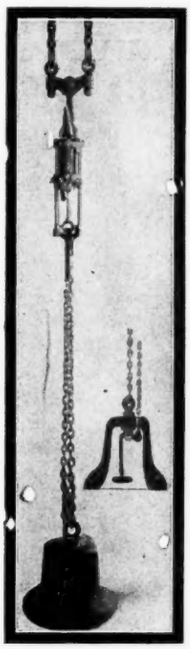
It is obvious that when a sound impulse is given to the liquid in the receiver in the hold of the ship it will be transmitted electrically to the telephone receiver in the pilot house. As the sound travels through the water in every direction from its source, it is found that the impulse will be stronger and louder on the side of the ship nearest to the source. By this means the direction of the sounding bell is ascertained, for by listening to the telephone receiver attached to the starboard side water receiver, and then switching over to the port side and listening to that telephone receiver, the ear detects at once which is the louder sound of the two. This was determined experimentally by turning the ship around in a large circle, when the difference in the sound from one side to the other was very noticeable, according to which side was nearer or farther away from the sounding bell. A portable apparatus for small fishing boats is shown in another illustration. The bell is shown on the right of the picture, which is suspended over the side of the boat, the hammer being operated by a separate rope. In the box is a coil of electric cable attached to a hollow water-tight spherical globe containing the electrical transmitter. This is lowered overboard with the bell and enables two boats so equipped to signal to each other. The sound is conveyed from the spherical transmitter bulb while immersed in the water to the telephone receivers in the same manner as previously described. A depth of twenty-five feet is said to give the best results.

In foggy weather signals of this kind are readily heard, regardless of which way the wind is blowing.

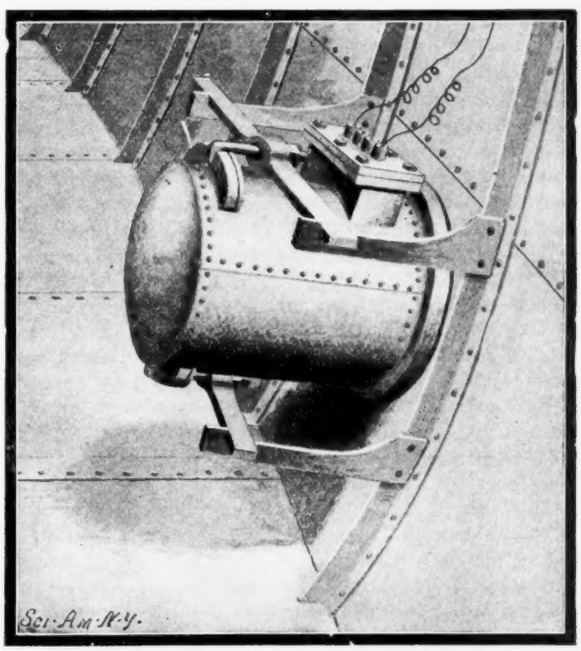
Our representative, while on the "Herman Winter," observed the perfect operation of the apparatus when approaching, passing and leaving the "Pollock Rip" lightship. It had been prearranged that the signal should be the number 73, the number of the lightship. This locality was reached shortly before daylight, yet when the ship was seven miles from the lightship, tossed by tempestuous seas, the signal, seven strokes, then three, was faintly but distinctly heard. Within two miles it was quite loud, and the peculiar musical note of the bell was plainly noticeable. It is feasible to signal words with a special code, and no doubt such a system of communication will soon be perfected. The usefulness of the system in safeguarding ships against collisions at sea at night or in a fog is evident.—*Scientific American.*



THE TELEPHONE SOUND RECEIVERS.



SIGNAL BELL.



THE SOUND HOLD-RECEIVERS.

TELEPHONE WAR.

A war has been declared on the Bell Telephone Company by the merchants of Jonesboro, Ind. Two companies have franchises in that town—the Independent and the Bell. The merchants did not care to pay for two telephones and adopted the Independent.

The Bell company then threatened to enter the mercantile business by establishing a large department store. At a meeting of the merchants recently it was decided to order the Bell telephones out of the places of business. Any merchant in the future who uses a Bell telephone in his place of business or at home will be expelled from the association.

ONE WAY TO BEAT A TELEPHONE COMPANY.

"One of the telephone companies charged me a quarter for service they did not furnish last week," said a man at the Coates House this morning, "but I got even with them."

"How did you do it?" a man standing at the desk asked.

"When I was in St. Joe Friday I told a business man there I'd call him on the telephone Monday. I arranged for him to have his clerk say he was out of town if he wanted me to come up and see him. I called Monday and received word that the man was out of town. That was all I wanted to know. I went to St. Joe and saw the man. The telephone company served me without cost. I may have 'beat' them that time, but they 'beat' me the other time. Now we're even."—*Kansas City Star.*

Nodd—The telephone is certainly a great thing. Think of it! A man can talk to his wife fifty miles away. Todd—Well, you're an exception. All I've been able to do is to listen.—*Town Topics.*

Municipal Telephony in England

A. R. BENNETT, M. I. E. E.

But two new municipal exchanges—Swansea and Brighton, were opened for traffic during the year, increasing the number of competing systems to five. The older ones all developed considerably, the figures at December 31, 1903, standing as follows:

	Number of switch-rooms working.	Number of instruments connected.
Guernsey	8	1,215
Glasgow	19	10,632
Portsmouth	6	1,486
Swansea	3	579
Brighton	2	431
	38	14,343

In addition, each place had a considerable number of orders still to execute, numbering 500 in the case of Glasgow and 900 at Brighton. The increase in number of working instruments since December 31, 1902, is 5,649.

Guernsey still retains pride of place as regards number of telephones to population, having one working instrument to every thirty-three persons. Deducting women and children as telephonic non-efficients, it follows that nearly every seventh or eighth Guernseyman is a telephone subscriber. Surely a striking illustration, this, of successful administration by a local authority. Telephoned on the same scale as Guernsey, London would possess nearly 200,000 working instruments, and Glasgow, Liverpool and Manchester about 30,000 each. The competing exchanges in Glasgow number together nearly 20,000 telephones, and it is possible that, counting in this way, Glasgow may overtake Guernsey in the near future; but Liverpool and Manchester lag hopelessly behind.

The corporation of Hull is to beign the construction of its exchange during the current month, and 1904 will undoubtedly see it at work.

The sale of the corporation exchange at Tunbridge Wells to the National Telephone Company has been followed, as was confidently predicted, by an outburst of discontent. It is asserted that the service has greatly deteriorated, and is now as untrustworthy as before the competition, and that the company has not kept to its engagements as regards charges. Meetings have been held and representations made to the town council, but nothing is likely to result since no remedy exists, the foolish bargain having failed to provide for such a contingency. Threats of renewed competition have been uttered, but these are simply childish. A competing telephone service is possible for every community in the kingdom except Tunbridge Wells. After the manner in which the burgesses allowed themselves to be outwitted, they would never again be trusted with a license, and no sympathy will flow their way, whatever betides. The company may safely laugh at their protestations. "Woe to the conquered—to the victors the spoils!"

Owing to the short periods for which Portsmouth, Swansea and Brighton have been at work, no accounts from these centers can be available until after March first. There is no reason to doubt favorable results. In each town the corporation service is a very great improvement upon anything previously known, and attracts new customers freely, in spite of the large selection of low tariffs offered by the opposition, while working expenses are not likely to prove abnormal. The work at Portsmouth was carried out for less than the original estimates, and in all probability the same satisfactory experience will be repeated at Swansea. The statement, given currency to by the *Manchester Courier*, that the trial balances at Portsmouth only showed a profit by omitting to charge interest and sinking fund is directly contrary to the truth.

The published accounts of Guernsey for 1902 (fifth year of working), and Glasgow for 1902-03 (first complete year of working) are admitted to be satisfactory by all impartial critics. In both cases the exchanges have been fully maintained out of revenue, and respectable surpluses remain. Depreciation will also come in good time. Our opponents are not unnaturally annoyed that the Glasgow Telephone Committee had the good sense not to load their first completed year's accounts with an artificial depreciation fund and so afford them the much-desired opportunity of circulating the kingdom with the glad tidings of a loss. Very few, if any, municipal electric lighting undertakings have made ends meet in a shorter period than three years except by omitting depreciation, and it is very flattering of our competitors to expect us to provide full depreciation in our first year. It might have been done, no doubt, had it not been for the telephone committee's wise determination to provide so liberally for future requirements in the way of ducts and cables, to distribute underground and to go beyond the estimates in various other ways. The locking up of such a large amount in plant which cannot be remunerative for a considerable time was never contemplated when the estimates were framed; not, indeed, until after the construction had commenced, and the grumbles of the public at the widespread disturbance of the streets had decided the committee to guard against reopening by laying sufficient pipes for many years to come.

The Glasgow accounts have been the occasion of many attacks, probably unparalleled in vindictiveness, on the part of several journals, only one of which, however—*Engineering*—carries any weight. Truly, the way of reformers is hard, especially when vested interests block the road. One cannot stop to kick every cur that yelps at one's heels, but Bailie Stevenson, the senior magistrate at Glasgow, and myself, in a spirit more of sorrow than of anger, strove to set *Engineering* right, as we believed the editors were the dupes of some designing contributor. The *Tunbridge Wells Courier*, the *Manchester Courier* and the *Electrical Review* may safely be left to yelp. In the case of the last, allowance must be made for the drastic manner in which I exposed their criticisms of the Mutual Telephone Company in 1891 when the learned editors, on the assumption that inches square were identical with square inches, proved that the switchboard which the Mutual had been using for some months was an impossibility, and stated that a town with a call-wire system could not work in conjunction with another town with indicators. Of course, I made fun of them, and the recollection probably rankles still.

There is one criticism which has been driven home with Titanic steam-hammers by all our kindly censors; and which, as it superficially wears an air of plausibility, it may be worth while to controvert. It is said that while estimates were for a certain number of "lines," extension instruments, which are often only in the next room to the main exchange instrument, are taken credit for in the accounts as "lines," which is deceptive, dishonest, wicked and so on, because an instrument and a short length of connecting wire from an adjoining room cannot compare in cost to a completed line with its cabled metallic circuit, switchboard and test-room accommodation, etc. Great feats of figure juggling have been based on this supposed fact. By deducting all extension instruments and everything not of the nature of a direct

exchange line and dividing the capital expenditure by the remainder the average cost per line is run up in a manner most gratifying to champions of monopoly. When, again, it is desired (which is always) to show that the average receipt per line falls short of the estimates the ingenious critic forgets to deduct the extensions, etc., divides the revenue by the total number of instruments! But the accounts are quite correct in reckoning by number of instruments, or "stations," as our Continental friends call them. In framing estimates it is impossible to forecast the number of extension instruments that may be wanted because the requirements in this respect of different towns are so widely at variance that no percentage calculations based on experience elsewhere are in the least likely to prove correct. And, fortunately, it is not necessary to trouble in the matter, since if all the cable and switch-room and test-room accommodation estimated for is actually provided (and this is always done) it is no advantage to the undertaking, but the reverse, to have to supply a large number of extension instruments because, while the capital outlay for a completed exchange line has been incurred, only a comparatively small revenue is derivable from the extensions actually completed, thus leaving an undue proportion of interest and sinking fund to be borne by the revenue from the direct lines really connected. The unused cable lines, switchboard and test-room accommodation remain as assets, and are credited in the books to the spare line account. The following will make the matter quite clear. An estimate for a completed line includes:

(a) One subscriber's instrument, lightning and high-tension guard, with internal wiring.
(b) One metallic circuit cable line of average length, with share of joint-boxes, etc.
(c) One distributing spur of average length, with insulators and share of pole, arms, etc.
(d) One subscriber's position on exchange switchboard with cabling and share of operator's equipment, batteries, etc.
(e) One subscriber's position on exchange testboard with cross-connecting wiring.
(f) One subscriber's position on exchange lightning and high-tension guard frame.

When an extension instrument under the same roof has to be supplied, only one of these items (*a*) is actually brought into use, with the addition of a special item, viz., a through switch and extra bell, which are not required on a direct line, but which are usually included in the sundries estimate. When the extension instrument is in another building items (*a*) and (*b*) are brought into use, and items (*c*), (*d*), (*e*) and (*f*) are entered in the spare line book. Thus, as the full estimated expenditure has been made and what is not immediately used is reserved for future requirements, it is quite fair and proper to count extensions as "lines" in the sense of satisfying the estimate. This simple fact, upon which mountains of vituperation have been piled, is, of course, well understood by all telephone engineers, and if the editors of *Engineering* had only had a glimmering of what they were writing, or suffering to be written, in their columns, they would have been spared much ridicule. The other so-called criticisms, when not absolute fabrications, distortions of fact or cant about depreciation, are quite as nonsensical as this one. To credit such vaporings it is necessary to believe that the telephone committees in Guernsey, Glasgow, Portsmouth, etc., are composed mainly of rogues who are backed in their misdeeds by equally rascally engineers and auditors. But sensible people don't believe anything of the kind. They *do* believe that it is in somebody's interest to be perpetually flinging mud, and that somebody imagines that it pays them to reprint the various articles, without printer's imprint or other indication of their origin, and to strain the mail bags to bursting point by posting them in tens of thousands to town councillors and telephone subscribers all over the kingdom. Sensible people ask "Who pays?" and also want to know, you know, if any other undertaking, corporation or otherwise, has ever been subjected to an equally determined and impudent attack before, and, if not, why it has been reserved for municipal telephony to be constituted such a special target? And sensible people not only ask these questions, but easily find answers for them, too. And then they order corporation telephones! It is all very funny.

Some other journals have been hypnotized by the catchword "depreciation," and have written about it in evident sincerity. They do not seem to see that there is anything absurd in seeking to keep up a great undertaking equal to new out of revenue and at the same time paying off the capital twice in twenty-five or thirty years, once as sinking fund and once as depreciation, thus putting the whole burden on the shoulders of the present generation, and presenting our successors with a new, up-to-date system, free, gratis and for nothing. The assumed possibility that the ratepayer of the future may have to bear some part of the burden appears to bar the way, in their minds, to all progress and improvement. "Don't move," they say, "and then you won't tumble,"—which is just the kind of policy that is causing transfer of British trade to foreigners and just the reverse of the enterprising spirit which made us commercial monarchs of the world for generations. Depreciation has no place in the accounts of railway companies, of water or gas companies, or of the National Telephone Company itself. It only starts into prominence for the purpose of flagellating corporations who have the courage to challenge oppressive and non-progressive monopolies. Professor Dicksee, in his standard work on "Auditing," lays down the rule that the average life of the plant concerned having been carefully ascertained, then "wherever the due provision for depreciation exceeds the sinking fund installment, the *difference* must be charged against revenue in addition to the sinking fund installment, in order that the accounts may show the true financial position of the trading." This view, which is shared by other financial authorities, is the one I adopt. It has the merit of doing justice to our successors in the privilege of paying rates without robbing ourselves. Glasgow pays a liberal sinking fund, and whatever may be required in addition for reasonable depreciation will be readily found by the business. Already, at the end of the first completed year, over £2,000, which may be devoted to this purpose, is in hand, and the current year will provide several times that amount.

In the meantime, the present-day ratepayer is making a good thing out of municipal telephony. All corporation telephone departments are assessed and have to pay rates. In Glasgow, a new and considerable rateable value has been created in the corporation telephone system, and the contributions to the rates out of revenue already amount to over £2,000. This is exclusive of rates on buildings which would presumably have been occupied by others had the telephone department never existed—it represents the assessments on the works actually created by the department. The industry is entirly new, and in its absence this large sum would have to have been found by the ordinary ratepayers. The Glasgow ratepayers as a body are consequently already, in only the second year of the enterprise, in receipt of a direct dividend on their telephone investment of some £2,000, and the cry that cheap telephones only benefit the few is shown to be more than ever unfounded. Added to the surplus of £2,092 brought out in the accounts this makes £4,000 to the credit of the undertaking. And above and beyond this the department may fairly point to the great advantages it has won for the community in the shape of a vastly improved and immensely extended telephone system; to the very considerable volume of work it has provided for manufacturers of cables and telephone appliances, and to the constant and remunerative employment is has found for hundreds of employes of both sexes.—*London Electrical Review.*

I was one of the pioneer subscribers to TELEPHONY and think it is the best telephone journal being published.—CAMERON L. BAER.

PERSONAL

F. H. Wheeler has recently reopened his old office at 705 Plymouth building, Chicago, where he will engage in telephone, electric light and power construction as the Wheeler Electric Construction Company. Mr. Wheeler is a pioneer in electrical construction work, having been engaged in it since 1885. In 1898 he entered the field as a contractor with offices in the Plymouth building. A year ago he accepted the position of chief engineer of the Imperial Finance and Construction Company of Toledo, O., but has recently severed his connections with that company, and will again engage in the construction field as an Independent engineer and contractor. Mr. Wheeler has to his credit the construction of a great many telephone and electric light plants throughout the United States and Canada which he has installed during his career.

C. H. Savage has accepted the management of the Paulding (Ohio) Home Telephone Company.

E. W. Ellison is organizing a company for the construction of a telephone system at Chesterfield, N. J.

Guy L. Merrill has purchased the Citizens' Telephone System and secured a franchise at Albion, N. Y.

B. E. Collins has been elected president of the Winnebago County Telephone Company at Rockford, Ill.

E. W. Ellison and associates are organizing a company for the construction of a telephone system at Chesterfield, N. J.

John Crocker, owner of the People's Telephone Company, Moroa, Ill., recently returned home from an extended western trip.

J. A. Peterson has a franchise at Wimbledon, N. D., for a telephone exchange and will have work started in the early spring.

S. S. Rames has been appointed manager of the Menno-Wittenberg Telephone Company, recently incorporated at Menno, S. D.

Carl Hering, a past president of the American Institute of Electrical Engineers, has recently been elected president of the Engineers' Club of Philadelphia, Pa.

S. G. McMeen, the telephone expert, has returned to Chicago after completing the preliminary work of mapping Mexico City for the new underground telephone system.

Professor F. B. Crocker of the electrical engineering department of Columbia University, New York city, N. Y., recently sailed with Dr. M. I. Pupin for a short trip in Mediterranean waters.

T. W. Crowley has been appointed superintendent of the telegraph system of the Delaware & Hudson Railroad Company, to succeed J. A. Burdick, who has been transferred to another position with the company.

Henry Shafer, president of the International Telephone Manufacturing Company of Chicago, has been making an extended trip through the Northwest in connection with the growing work of the company in that large and important section.

Dr. E. C. Kilbourne of Seattle, Wash., has resigned his position with the Union Electric Company and will become a partner in the Kilbourne-Clark Company, which, it is said, is one of the largest electrical supply concerns on the Pacific coast.

Mr. W. F. Richardson has been transferred from the Cleveland (Ohio) branch of the John A. Roebling's Sons Company to the San Francisco branch of the company. Mr. Richardson was formerly assistant manager of the company's Cleveland office.

James A. Cummings, who secured the contract for the supplying and laying of the conduits for the new municipal telephone and telegraph lines now under construction in St. Petersburg, Russia, has sailed for Europe after several weeks' visit on this side.

Charles O. Harris has accepted the general management of the Utah Independent Telephone Company of Salt Lake City, Utah. Mr. Harris is one of the best known men in the Independent operating field and the company is to be congratulated on securing the services of so able a manager.

J. Handy Moore has purchased the entire business and property of the Sikeston Telephone Company, including the lines running into Bloomfield, Dexter, Morehouse, Sikeston, New Madrid, Charleston, East Prairie, Oran, Morley and Commerce, comprising, next to the Kinlock, the largest Independent telephone system in Missouri.

W. L. Hodges, who for some time was associated with Dr. Louis Duncan, working principally in the telephone field, and who has been recently located in Philadelphia, has been appointed manager of sales of the National Battery Company. Mr. Hodges has resigned as manager of the appraisement department of the Audit and Appraisement Company of America.

G. M. Gest, the expert subway contractor of New York, Cincinnati and Chicago, has been awarded the contract for the construction of a heavy forty-duct conduit system by the Public Service Corporation of New Jersey. This system will cost several thousand dollars and is a main trunk feeder line running through Hoboken and Jersey City. Work is to be begun on March 15 and a large force of men will push it to completion as rapidly as possible.

Mr. J. L. Putnam, who for some years has been general manager of the Clark Automatic Telephone Switchboard Company of Providence, R. I., and whose personal efforts have resulted in the installation of this system all over the country, has resigned his position to accept one with the Central Union Telephone Company at Indianapolis, Ind. Mr. Putnam goes to his new work with the best wishes of all his friends, of whom he has a goodly number.

WAR AND THE TELEPHONE.

The Japanese are great believers in the value of the telephone for governing the movements of skirmish lines and of troops operating rapidly at some distance from the main body. During the war with Corea in 1894, on the day following the battle of Ping Yang, the Japanese signal and telegraph corps completed a temporary line from Seoul to Ping Yang, a distance of seventy miles, and sent messages over that line in rapid succession. One factor of material advantage to the Japanese in the matter of rapid construction is that they use poles of bamboo, which are exceedingly light and easily transported.

THE LADY AND THE TELEPHONE.

SCENE: *Sitting-room of a beautiful villa on the banks of the Harlem. A lady, discovered alone. She is seated by a work-basket on a low stand, and is sewing. Opposite her, upon the wall, is the simple telephone of commerce. The lady has the conversation entirely to herself. She speaks:*

"I don't know that that was the best place for it. Still, one can't have it in the hall exactly, because it seems too public. Besides, if a tramp should come to the door and refuse to go away, and I wanted to telephone for the police, I shouldn't want the tramp to hear me asking the chief of police to be kind enough to step around and get the tramp. And it wouldn't do to have it in the kitchen, because—why, of course not! They'd be using it for—I don't know what!

"And now I've put it in here, I can't say I think it is exactly decorative. It looks like a patent pump, or a mechanical music-box orchestra with a trumpet attachment, or a tablet to the late lamented Blowelli, cornettist. No matter. It is going to be a great convenience, I'm sure. I'm just *dying* to use it, and—I'm deathly afraid of it, too. I believe I'll try it now. But what shall I say? I know—I'll call John up at the office, and give him a little surprise. Besides, I can ask him whether he mailed the letter to mother.

"Let me see—what do I do first? There's a bell to ring somewhere. Do I ring first, or do I speak first—or whistle? But I can't whistle."

[*She puts up her sewing, rises, and goes over to examine the telephone.*]

"Isn't it just too mysterious!"

[*She takes down the receiver and puts it to her ear. A pause.*]

"I can't hear a thing—only a sort of a whirring. It is perfectly blood-curdling!—I may get an awful shock!"

[*She drops the receiver and steps back a pace or two.*]

"What would our ancestors have thought of it! Probably it would have seemed like magic to them; they couldn't have understood how it works. Neither do I, for that matter. It is one of the marvels of the age, so John says. I'm glad there are such things as men to understand these marvels for us."

[*The bell rings three times, sharply.*]

"Goodness me! What have I done? I didn't do a thing! What shall I do? I suppose I've got to do something."

[*The bell rings again, three times.*]

"Now it is getting mad. I think I'll risk it."

[*She picks up the receiver, and holds it as if afraid of it, at some distance from her ear.*]

"Why! . . . Isn't that the funniest thing? I hear Mrs. Blenker's voice."

[*Pause, while the lady gradually puts the receiver closer to her ear, and smiles.*]

"I didn't know she was going to have company to-night. She ordering charlottes from the baker. [*Pause.*] Why, I always have to pay as much as that!"

[*The bell rings once.*]

"Why, they've stopped talking. [*She puts up the receiver.*] How queer it is to listen . . . But, heavens! what *have* I been doing? I have been eavesdropping. Wasn't it horrid of me! And I never meant it. I must act just as if I hadn't heard a word; and yet how can I? Mrs. Blenker refused an invitation to play whist to-night because she had a previous engagement, and now she is ordering the charlottes at the last moment. What a double-faced thing she is! It is worth the whole cost of the telephone to have found her out! I'll let her know— But I *can't*, for I had no business to hear her. And yet, I didn't know, and so it was no harm."

[*She goes to the telephone, and resolutely rings the bell.*]

"There, now I've wound it up."

[*She forgets to take down the receiver. After a while her bell rings twice.*]

"Goodness me! It's ringing all by itself! Perhaps I've deranged the works. I'm not going to bother it again."

[*She returns to her sewing. After a moment the bell rings again.*]

"There it goes again. Horrors! Suppose I wound it up so it will keep going like that all the morning! They ought to have directions to go with it. And now I think of it, I believe they have. John always laughs at me because I don't look at the index of a book, and now I forgot the index of the telephone."

[*She rises, and reads the directions on the face of the instrument. The bell rings twice.*]

"This is worse than an alarm-clock. Oh, I remember! That's our ring. Two, John said."

[*She takes down the receiver and puts it to her ear.*]

"What? Oh, yes. Yes. I'm so sorry. But I didn't know. I rang? Oh, yes. So I did. What number? I don't know. I just wanted to speak to John. What *number* John? I don't know, I'm sure. I didn't know he had a number. No, no! [*She giggles.*] Not John street, but my husband John. Yes. Get his number? Oh, I see. Yes. We just had it put in to-day. Thank you. I'll look him up."

[*She hangs up the receiver and goes to consult the book of addresses. Turns it over helplessly. Takes it over to the table, and resumes the search.*]

"No. He isn't there. What use is a telephone, anyway! I sha'n't meddle with it again till John comes."

[*She puts up the book with a slam. Just then the bell rings twice.*]

"This is perfectly awful! Why, I sha'n't have a moment's peace. I think it is worse than an invalid in the house."

[*The bell rings again, twice. She makes a face at the telephone, and then reluctantly goes to it and takes up the receiver gingerly.*]

"Oh, it's you, is it John? I'm so glad! Yes. I hear you perfectly. Yes. It is certainly a great comfort. No; not yet. But I think she'll go before the month is up. Yes. Did you post my letter to mother? I'm sorry. I meant it to go by this morning's mail. But there's really nothing in it. Wait, John; I want to tell you something so funny! Yes. It was Mrs. Blenker. I didn't know, and I put the telephone to my ear, and I heard her ordering charlottes for *to-night*. Yes. She refused, you remember, on account of a previous engagement. So you see what her word amounts to! Yes; I always said so. She is as deceitful as she can be! No; it *couldn't* be, because unless she was ordering the charlottes for the first time, she wouldn't have been dickering over the price like a skinflint. No. I never will. I just despise her, and always did. It's the last invitation she'll ever get from me.

"You won't forget the letter now? No, no great hurry. I meant it to go early. No matter. No; don't send it. It's of no importance at all. Wait a moment. What is your number? What? Your company? Of course, I see. Yes, I'll put it down. Good-by!"

[*She hangs up the receiver. Then she gets a stocking from her work-basket and puts it over the bells.*]

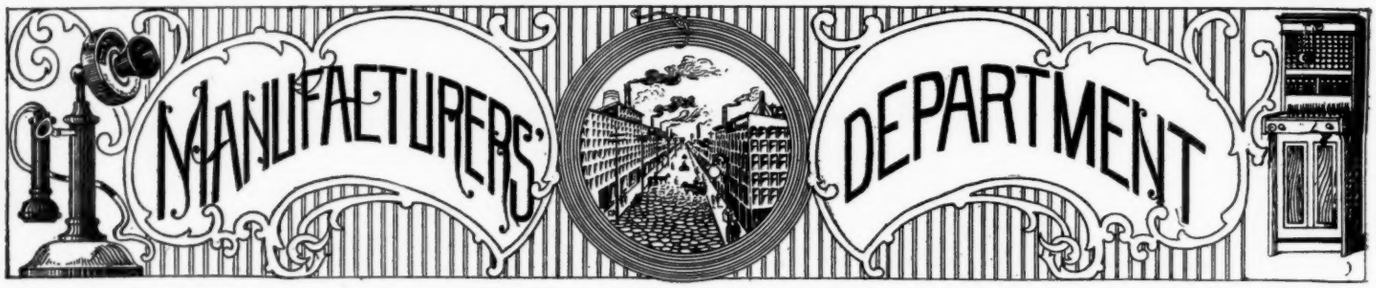
"There! I don't intend to be bothered by that bell again this morning, or I'll never get my work done."

[*Suddenly she stands transfixed.*]

"Suppose Mrs. Blenker was standing at *her* telephone listening to every word I said! If she was, she'll never speak to me again.

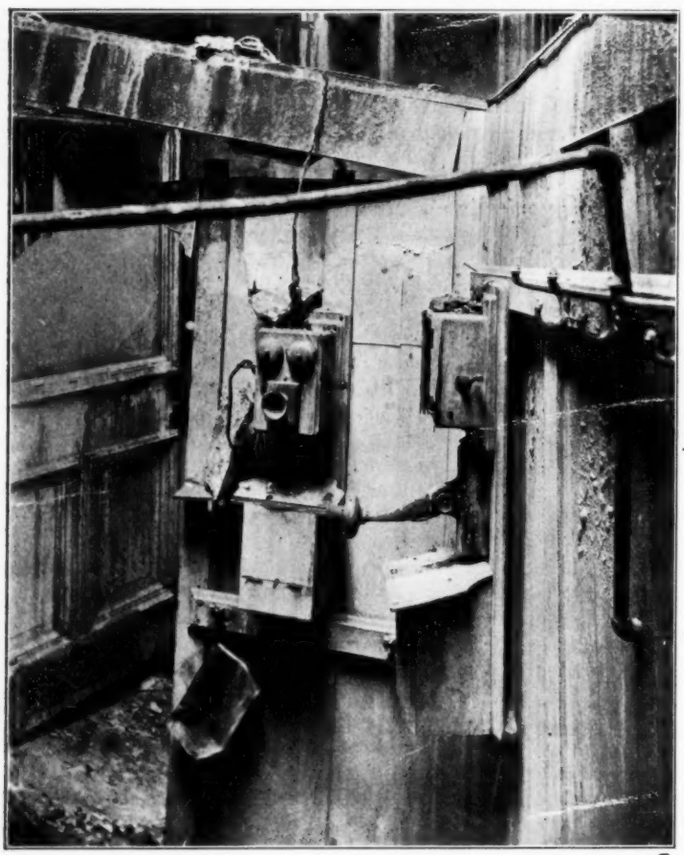
"I just *hate* these modern improvements!"—*Tudor Jenks, in Century Magazine.*

The telephone is the nearest human of all inanimate objects.



STANDARD APPARATUS WITHSTANDS FIRE.

Sunday morning, February 28th, the state capitol building at Madison, Wisconsin, was destroyed by fire, entailing a loss of half a million dollars. The entire building burned, with the exception of the extreme end of the north wing, occupied by the supreme court and its library. The accompanying illustration shows one end of the office of the superintendent of public instruction, after the fire. The telephone showing front view is a Standard, manufactured by the Standard Telephone and Electric Company of Madison, Wisconsin, and was installed by order of the capitol authorities in 1896. The other instrument shown in the illustration is the property of the Wisconsin (Bell) Telephone Company and was put completely out of service, while the Standard, after having had large pieces of stone and ashes fall upon it, was found to be in perfect working order. Central was signalled without difficulty and the bells of the instrument responded as clearly after the casualty as it had before. The instrument was disfigured by falling stone and injured by the flames, but it worked as effectively after this treatment as it did when first placed upon the wall.

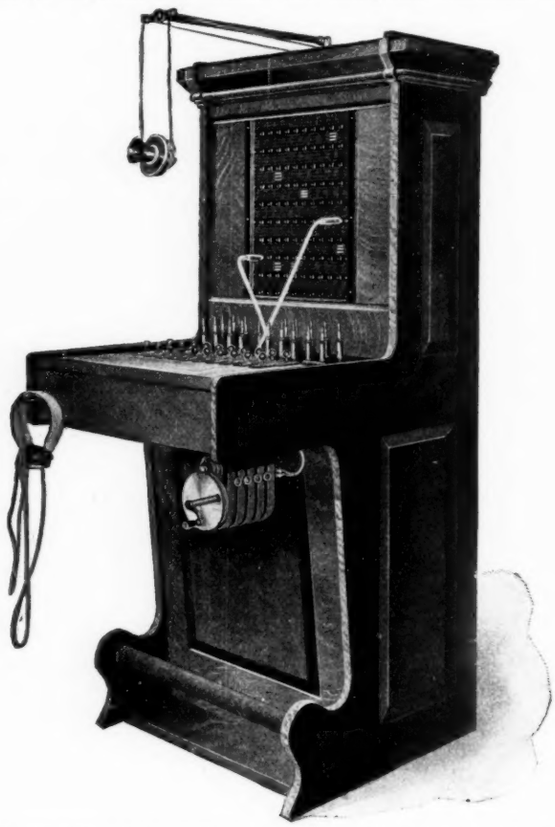


In my opinion you have the greatest telephone journal published and I am pleased to see it grow better with each issue.—B. S. Gordon.

A COMMON BATTERY SWITCHBOARD ADAPTED TO MAGNETO SYSTEMS.

A new switchboard for magneto systems has recently been placed on the market by the Century Telephone Construction Company of Buffalo, N. Y., embodying many new features which make it desirable for this class of service.

Primarily this switchboard is for magneto exchanges where the superior operating advantages of the common battery system are desired, but where the efficiency of the outside equipment would not render it advisable to make the large expenditure which the complete common battery plant would necessitate. The switchboard is extremely simple in its construction and is claimed to be more durable, efficient and rapid in operation than the magneto drop board.



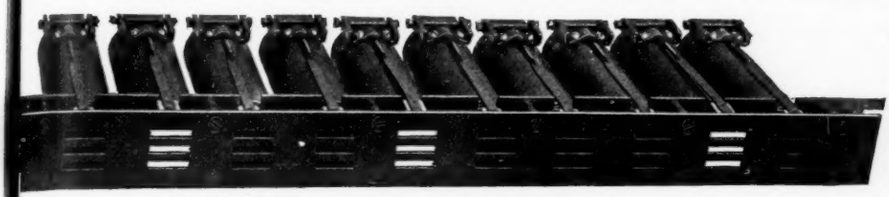
ONE HUNDRED LINE COMMON BATTERY SWITCHBOARD ADAPTED TO MAGNETO SYSTEMS.

The calling subscriber, by a slight turn of the generator crank on his telephone, energizes the line signal. This signal normally shows black, but when energized shows white and also closes a local battery circuit through its winding. The signal remains in this position until the operator, inserting an answering plug into the corresponding jack automatically restores the signal to its normal position and cuts the battery and signal from the line. The supervisory signal, which is energized in the same manner as the line

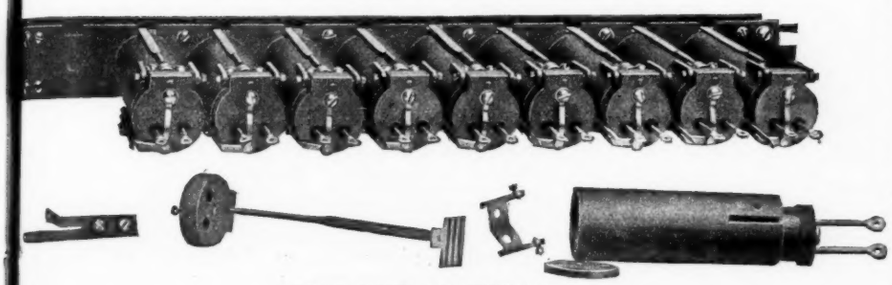
signal, notifies the operator that the subscriber is through. The operator upon withdrawing the plug from the jack automatically restores the supervisory signal to its normal position.

The cost of maintenance of this switchboard is said to be less than for a magneto drop board of the same size, while the operating expenses are considerably less, as fully thirty per cent more lines can be handled.

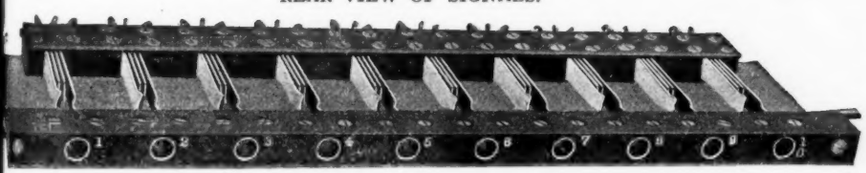
If automatic signalling is desired, that is, by removing the receiver from the hook to give the calling signal, and replacing it to give the disconnect signal, the Century Telephone Construction Company constructs the board so that all that is necessary to do is to connect a condenser in the ringer circuit of each telephone. This condenser is especially made for this purpose and can be mounted and connected in a very few minutes. The switchboard is also constructed so it can be changed to a full common battery board with but slight alterations. In these boards, lamp supervision can be installed instead of the visual signal. In the automatic signalling and common battery type, separate supervision for each cord can be provided. An automatic lamp transfer system is installed when the switchboard has arrived at a capacity that prevents the operator from reaching all lines conveniently.



VISUAL LINE AND SUPERVISORY SIGNALS.



REAR VIEW OF SIGNALS.



STRIP OF TEN LINE JACKS.

All contacts are of pure platinum, carefully riveted to the springs, which is much superior to the common practice of soldering. The night bell service is exceptionally efficient.

The board is built in cabinet capacities of fifty, one hundred and one hundred and fifty lines, the larger sized cabinet being so arranged that additional cabinets can be added as desired.

The Century Telephone Construction Company will be pleased to furnish detailed information on the above boards upon application.

WIRING AND INSTALLATION.

The above caption is the title of a new book published by the Holtzer-Cabot Electric Company of Boston, New York and Chicago. The book refers principally to the wiring and installation of interior telephones and is illustrated with twenty half-page diagrams. It is comprehensive and will be found of great value to telephone men. Those interested may receive a copy of the book free by writing to the Holtzer-Cabot Electric Company, 395-397 Dearborn street, Chicago.

THE ANNUNCIPHONE SYSTEM.

The Electric Gas Lighting Company, Boston, has for many years made the manufacture of hotel annunciators a specialty. The company is now presenting in connection with its line of Samson junior telephones an annunciator fitted with telephone connections, which is called the Annunciphone. This type of instrument is one which the company believes should interest the Independent exchange manager, as in its opinion there are many places where this instrument would be more satisfactorily and properly installed than the ordinary telephone switchboard. The field is the hotel, manufacturing, mercantile and banking establishments who seek to secure interior telephone communication at less expense than present rates, or desire to have their own system. These desires can be met by the installation of an Annunciphone system, and at the same time enable the exchange to realize a satisfactory profit.

In fact, the manufacturers claim that a number of exchanges have recently awakened to the fact that interior service using the Annunciphone system can be offered either on a rental or straight sale basis to parties within their districts, without the necessity of using the more costly instruments which are required for exchange and long-distance work, and still furnish them with satisfactory service.

The points of advantage claimed for the Annunciphone system over the ordinary switchboard for small installations need only to be mentioned for the exchange manager to appreciate its advantages for small hotels and factory use. For hotel use, its general appearance and operation being the same as the annunicator, both the employer and employes are in a way familiar with the operation of the instrument. There is no great departure in its operation, and there is claimed to be much less danger of trouble than there is in the ordinary switchboard. It is simple in operation and no particular skill is required on the part of the operator. The same advantage is also true in other lines where it is preferred that intercommunication between stations should be under the supervision of a central station.

There is another important and valuable line of business for the Annunciphone. In communities too small to sustain a regular exchange, the hotelkeeper can install an instrument larger than the requirements of his house, using an extra number of jacks for the use of business men and others in the town who require telephone exchange service. In the hotel there is necessarily some one on duty at all hours, night and day, so that the additional work of taking care of a limited number of subscribers would not be at all burdensome and would result in considerable profit to the hotel man, aside from the fact that he is able to place his guests in communication with the business men of the town.

By reference to the illustration it will be noted that the Annunciphone is fitted with all of the auxiliary devices found in the ordinary switchboard. The jacks supplied are either the Samson metallic circuit "truss" jack, or for smaller or less expensive instruments a single-contact jack. Intercommunicating cord pairs are supplied, in connection with which can be fitted listening-in cams and supervisory signals, the operation of which is the same as in the ordinary switchboard. The outside service jack, which enables the clerk to place the rooms in communication with sub-

scribers of an Independent telephone exchange, is shown in the illustration and can in addition be supplied with supervisory. The operator's instrument can be attached to the case or it may be a hand microphone, a desk set or a wall set. The number of cord pairs can be as many as required to facilitate intercommunication. The resetting mechanism can be common, by which the drops are all set at one time, or can be divided into sections and operated manually or electrically by the pressure of a push button.

The flexibility of the system, enabling it to meet the figure the purchaser desires to expend, will be at once appreciated. If it is desired to economize, the number of intercommunicating cord pairs can be reduced and the supervisories and the listening-in cams dispensed with.

The Annunciphone shown is fitted with the company's Safeguard fire alarm system, which consists of a powerful clock movement revolving the arm over a series of contacts representing various rooms, and which is set in motion by the removal of a plug which holds the contact arm, which is located back of the door which covers the mechanism. After removing the plug the arm commences to revolve,

100-DROP ANNUNCIPHONE.

ringing the bell in each room intermittently six times per minute. The manufacturers claim they have installed this system on annunciators containing over 500 indications, where it is giving perfect satisfaction. This feature cannot be secured in connection with a switchboard.

The manufacturers claim that this line of apparatus has long since passed the experimental stage, that it is now standardized and has been installed in many hotels, business houses and factories, where they are giving continued satisfaction.

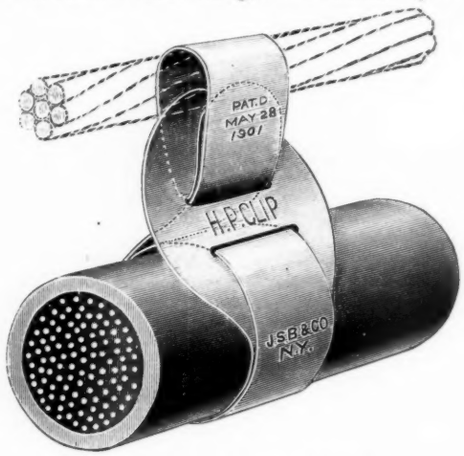
In connection with the Annunciphone the Electric Gas Lighting Company also manufacture a line of room telephones which for compactness and beauty of design seem to realize all that is desirable. The woodwork is made from a higher grade of stock than is usually used in this class of work and the interior mechanism is well designed and carefully made.

All of these instruments are made completely from the raw material in the company's factory. The company claims to make all of the punches, dies and tools, as well as to conduct the subsequent steps which changes the raw material into the finished article. In no case are products of other manufacturers used, as is too often done in this class of work.

H-P. RUSTLESS CABLE HANGER.

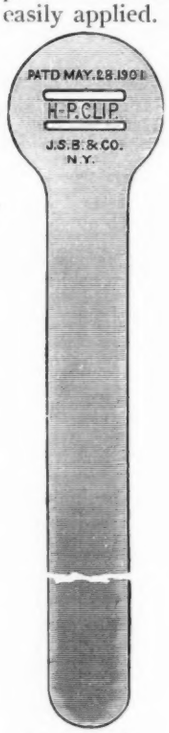
There has always been a great demand for cable hangers. The number in use runs into the millions and will be doubled in the next few years. Modern construction in the telephone field means an ever-increasing demand for cable, and the hanger is of course an indispensable adjunct.

The H-P Rustless cable hanger is claimed by the manu-



H-P RUSTLESS CABLE HANGER.

facturers, James S. Barron & Company, 127-129 Franklin street, New York city, to be everlasting. The H-P hangers possess many points of merit. Its simplicity and strength appeals to the practical construction man and the fact that it is *rustless* and indestructible is its strongest claim to popularity. The H-P hangers are made of zinc and of one piece. Besides being rustless they are durable, strong and easily applied. They will not jump off the suspension wire



COMPLETE.

FIG. 1.

FIG. 2.

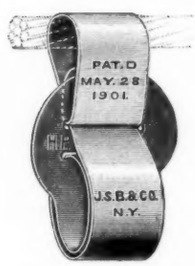


FIG. 3.

nor allow the cable to slip. The grip tightens with each strain on the hanger, and when it is once placed in position it remains so. The hangers are neatly packed in small boxes of 500 each.

The illustrations show a hanger in place (full size view) and the method of attachment to the cable and suspension wire. The circular enlargement is held in the left hand

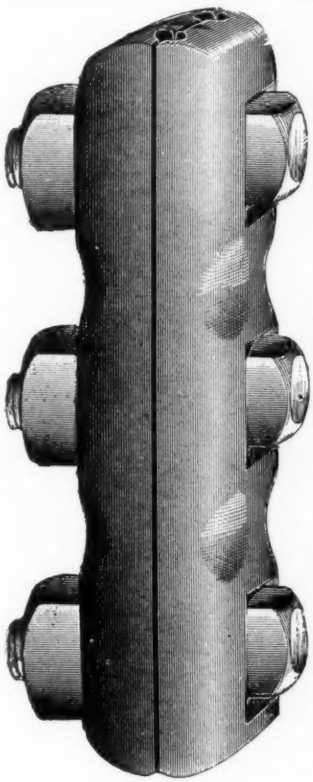
against the cable, while the free end is wound once around passing through the lower slot (Fig. 1). Around again, through the upper slot and over suspension wire (Fig. 2). The free end is bent and hooked into upper slot (Fig. 3). The hangers are nearly an inch wide and are made in length to accommodate any diameter of cable.

In speaking of this hanger one of the largest telephone companies says: "We have been using ——— clips but will have to replace all of them on account of rusting out of the iron hooks." Another company that has used about 400,000 H-P Rustless hangers in the past two years refuses to use any other hanger. R. H. Villard, an old expert in stringing cables, says: "The H-P clip is without doubt the coming clip."

The company is making an exceptional offer on these hangers and will be glad to send sample hanger free upon request. Address James S. Brown & Company, 127-129 Franklin street, New York city.

TELEPHONE GUY CLAMP.

The guy clamp in accompanying illustration will be of interest to those constructing and operating pole lines, and to dealers in pole line construction material. It is understood that the toughness of malleable iron lies near the surface, and that the strength of an article made of malleable iron is increased as the exterior surface of the article is increased. This feature is taken advantage of in the clamp shown, cavities being made between the bolt holes on the inside of the clamp, thus securing the maximum strength of the material. The clamps are galvanized by the hot process to conform to the requirements, specifications and laboratory tests of the long distance companies, the threads of the bolts being recut after galvanizing. The clamps are standard American Telephone and Telegraph Company pattern, and are furnished with either two or three bolts. The Newhall Chain Forge and Iron Company, 9 and 15 Murray street, New York, are the manufacturers of these clamps and also of other pole line material. A complete stock is carried at all times, the company will be pleased to send samples of its guy clamps and braces for tests and inspection, and name attractive figures on application.



COUCH AND SEELEY CATALOGUE.

The Couch and Seeley Company, 26-28 Binford street, Boston, Mass., has recently issued a telephone catalogue which is a most complete and comprehensive book, covering the company's full line of telephone apparatus, accessories and supplies. The catalogue is nearly one hundred pages in size and is well printed on fine paper. The illustrations are profuse and besides apparatus and supplies many interesting circuits and diagrams are shown. The company invites correspondence and will be glad to mail the catalogue to telephone men upon request.

THE CALCULAGRAPH.

To those intimately connected with the rapid growth of the telephone business during the past few years it is well known that no branch of the business has contributed more directly or more immediately to the increase of revenue and profit of the telephone company than the toll department.

It is also well known to telephone engineers and others who have made a study of the conditions pertaining to this branch of the service that it presents more opportunities for leaks of revenue than does the local contract service..

First—By reason of failure to collect from the consumer the full amount the company is entitled to receive, under its own rules, for service rendered. Such service is ordinarily charged for on a basis of time elapsing during the conversation at some fixed rate per minute or period of minutes for the distance covered. It has been, of necessity, the practice to require the operator handling the toll connection on the switchboard to calculate and record the time elapsing during each such conversation, thus fixing the charge for the service. The tools employed were usually a pencil and a clock having a visible dial; the time of day being noted on a card when the conversation commenced and again when it was completed, the first record then subtracted from the second to determine the elapsed time.

A long series of tests of toll records made under varying conditions in different exchanges and covering the work of a great number of operators have resulted in a showing that more than twenty per cent of the records of elapsed time so made contain errors exceeding one minute on each pessage and that over ninety per cent of such errors are made in favor of the patron.

In conducting such tests, inspectors using stop watches were employed. They then "listened in" on the line and made duplicate records for comparison. Having no other duties and being able to give his entire attention to timing a single message, the inspector's record, made with the aid of a stop watch, was assumed to be correct, while the operator had other duties which required attention and frequently had to handle several connections at the same time. It was found physically impossible for her to time messages correctly by the means above described. In most cases the record of elapsed time so made is little better than a "guess" or an "estimate." The most conscientious operator will give the patron the benefit of the doubt and he is charged in a large number of cases for the minimum period of time prescribed by the rules.

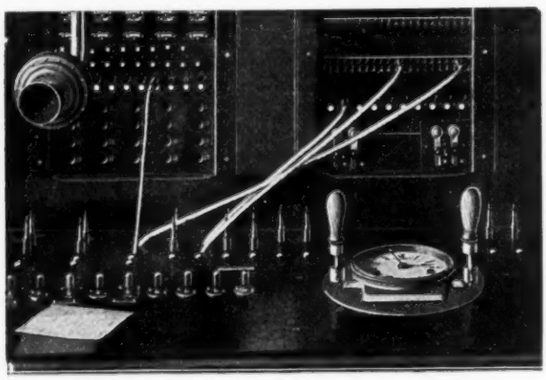
Secondly—As an inevitable result, when both sending and receiving operators on a toll line "estimate" the time consumed in a customer's talk over the line, their records do not agree. Then follows a hold-up of the line while the

two operators discuss the length of the last message. If they cannot "get together" the chief operator may be called in to "arbitrate"; meanwhile the line is producing no revenue for the stockholders and possibly some other patron who is waiting to use that line is impatiently "cussing" the slowness of the service.

To meet such conditions in the telephone toll service the Calculagraph was devised, and as its function is to calculate and record by mechanical means the time, in minutes and quarter minutes, which elapse during a toll conversation, it definitely fixes the charge for the same and effectively stops a series leak in the revenue of the telephone company employing it.

It makes no clerical errors. It is operated by pulling a lever, which can be accomplished without mental effort on the part of the operator and while she is attending to the switching of some other line.

It is interesting to note the increase in the number of "overtime" messages in an exchange where a Calculagraph is installed, during the first month it is in use. In a busy exchange or one where long haul messages are handled, the



CALCULAGRAPH FOR TOLL SERVICE.

increase in receipts from tolls due to such elimination of errors in timing is sufficient to repay the cost of the Calculagraph in a short time.

Besides, the timing of messages at the receiving end of the line may be dispensed with and both operators are relieved of much mental and manual effort and their efficiency in the other duties of operating is correspondingly increased.

Thus by proving its usefulness and wholly on its merits, the Calculagraph, wherever introduced, has made itself indispensable.

Over one thousand telephone exchanges in the United States are now equipped with Calculagraphs, those in the larger cities using from fifty to seventy-five instruments each, one company having 345 in service. They are also used in over two hundred towns and cities in Canada, in many of the larger cities in the German Empire, Japan, Australia and other foreign countries.

The Calculagraph is noiseless in its operation and may be mounted directly upon the switchboard or upon a pedestal standing on the floor alongside the operator.

Several types of the instrument are made. Exchange managers are requested to write the Calculagraph Company, 1416 Jewelers Building, New York City, for full information.

IMPROVING TELEPHONE PLANT.

The Portage Telephone Co., Portage, Wisconsin, being required to greatly increase its plant beyond the original expectations and ultimate capacity of its construction and central office, is making some large improvements and extensions in the plant to meet requirements. The plant originally installed about seven years ago was constructed with common return lines and equipped with individual generator-call local battery apparatus. The outside construction is being rebuilt with metallic circuit lines, using cables in all the principal leads, and a large part of the work is being put underground. The company has just completed a one-story, stone, fireproof building on a large lot to prevent other buildings being put up immediately adjoining, and this building has been arranged specially for a telephone exchange and office and will be used exclusively by the company for this purpose.

A contract has just been placed with the International Telephone Manufacturing Co., Chicago, for a complete central office equipment and telephones for the increase in the plant. The central office will be equipped with the well-known International central-energy switchboard, with double supervisory clearing-out signals and pilot lamps, together with a storage battery plant in duplicate, charging machines, ringing generators, power switchboard and distributing board with self-soldering heat coil protectors. There will also be installed a fifty-number farmer line and toll switchboard equipped with the International combined jack and self-restoring drop, provided with what is claimed to be a never-failing restoring device.

The system will be so arranged that the old generator-call local battery telephones may be used as centralized call instruments by cutting out the generator and cutting in a condenser. The new telephones installed for increasing the exchange will be full central-energy instruments. The old instruments are to be replaced with central-energy apparatus at intervals, as may be required. This feature makes the International system especially adapted for re-equipping old telephone plants. The Portage exchange, when re-equipped, will be most efficient.

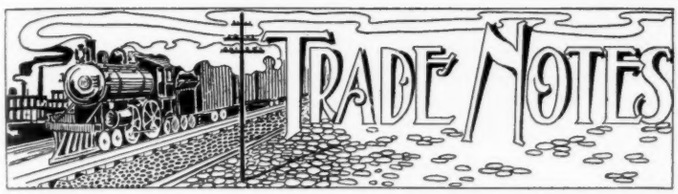
BAIRD TIME STAMP.

The wonderful strides being made in the improvement of time, money, and labor-saving devices used in connection with profitable telephony are always evident in Baird telephone apparatus. The rapid action telephone time-stamp, made by this firm, lends great assistance to profitable telephone service. It prints with a single rapid-lever action the date and time in quarter minutes, so clearly that lapsed time is computed at a glance. This machine is substantially built, guaranteed by the maker to give perfect satisfaction, and is claimed to have the good points embodied in other machines intended for this purpose and a number of superior features of its own in addition. The Baird Manufacturing Company, 3 Michigan street, Chicago, will send this machine to any company on thirty or sixty days' approval.

A NEW CEDAR POLE COMPANY.

The many friends of Millard Hopkins, formerly vice-president of A. P. Hopkins & Company, producers of cedar products, Escanaba, Mich., will be interested to learn that he severed his connection with the Hopkins company to engage in business on his own account. Mr. Hopkins formed the Chicago Tie, Pole and Post Company for handling railway ties, telephone and telegraph poles and fence posts. The organization includes in addition to Mr. Hopkins, men of long experience in these lines, and the company is doing a successful business.

The offices are at Escanaba, Mich., and all orders for poles, posts and shingles will be executed promptly. The management will always serve customers diligently and expects to receive the same liberal patronage as heretofore.



THE OKONITE COMPANY, LIMITED, 253 Broadway, New York city, announces that Mr. Carlos G. Palacios of Caracas, Venezuela, has just placed a large order for wire with the company.

THE FROST CROSS ARM AND LUMBER MANUFACTURING COMPANY, Cleveland, Ohio, has issued a leaflet containing some points in connection with "Frost" cross arms. Leaflet will be sent on request.

THE CALCULAGRAPH COMPANY, 9-13 Maiden lane, New York city, N. Y., has issued two interesting booklets treating on the calculagraph which it manufactures. These booklets will be sent on request.

CROCKER-WHEELER COMPANY, Ampere, N. J., announces that its Chicago office has established headquarters for western Ohio at No. 1232 Union Trust building, Cincinnati, Ohio, with Mr. H. A. Brown as representative.

THE EUREKA ELECTRIC COMPANY, Genoa, Ill., is sending to its customers a unique folder. It is in the shape of a telephone and is in colors. It describes the Eureka model 99 telephone. The folder will be sent on request.

THE NORTON ELECTRIC INSTRUMENT COMPANY, INCORPORATED, Manchester, Conn., is distributing a new price list on Norton ammeters and voltmeters. This apparatus is made in several styles and catalogue will be sent upon request.

MONARCH ELECTRIC AND WIRE CO., Chicago, is now in position to handle all orders and inquiries promptly on "Monarch Brand" W. P. iron line wire. This wire is said to be giving satisfaction wherever used and a fair trial for it is invited.

MICA INSULATOR COMPANY, Chicago and New York, has issued recently its 1904 price list of micanite, linotape, Empire cloths and papers, "M. I. C." compound, etc. The list goes into details of parts for a wide range of well-known apparatus.

THE STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY has issued a tasteful and striking folder as to its dry core lead-covered telephone cables, which it makes exclusively for Independent telephone companies, in addition to its other wires, cords, cables, etc.

THE EMPIRE WIRE COMPANY, 43 Exchange place, New York city, is distributing an accounting room calendar for 1904. On the reverse side of the calendar there is a table compiled by W. H. Wherry, Cleveland, Ohio, showing the average price of copper since 1883, month by month.

THE CONTROLLER COMPANY OF AMERICA, Chicago and St. Louis, has arranged to handle the entire product of the Gray Telephone Pay Station Company for the Independent telephone field. The addition of this line forms a valuable acquisition to the company's already extensive business.

THE CENTURY TELEPHONE CONSTRUCTION COMPANY, Buffalo, N. Y., has completed the exchange for the Corfu Home Telephone Co., Corfu, N. Y. This exchange is just open and has something over fifty subscribers. The equipment is a signal bell magneto board of thirty lines' capacity.

WILLIAM ROCHE, dealer in new standard electrical supplies, announces the removal of his offices to 52 Park place, New York city, N. Y., where all future communications should be addressed. Due to a large increase in business, it became necessary for Mr. Roche to seek larger quarters.

THE STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, Rochester and Chicago, has recently issued a little folder entitled "How did the conductor telephone from the car?" It is a reproduction of a newspaper clipping which tells an interesting story. The folder will be mailed free.

THE CENTRAL ELECTRIC COMPANY, Chicago, is sending out a circular which quotes attractive prices on American Circular Loom flexible conduit, for which it is sales agent. The company is also sales agent for Edison primary batteries and is prepared to make immediate shipments from a large stock.

THE NATIONAL WIRE CORPORATION, New Haven, Conn., has issued a condensed catalogue of its products, with price lists, tables of wire, etc. This booklet contains a number of valuable tables and a lot of useful information about the wire business. Copies will be furnished free of charge to any one interested.

THE OSBURN FLEXIBLE CONDUIT COMPANY, 21 Park row, New York city, manufacturer of "flexduct" for interior wiring, reports a large number of advance contracts. This conduit has become very popular for modern building wiring and the company's works is being taxed to keep up with the demand for this product.

THE NORTH ELECTRIC COMPANY, Cleveland, Ohio, has recently produced a new bulletin, No. B-22. This is a descriptive and illustrated souvenir of the North dividend payers. A number of handsome illustrations show switchboards of different types and also gives a very clear idea of the elements which make up this apparatus.

THE CROWE METAL MANUFACTURING COMPANY, Chicago, owing to frequent calls from correspondents, has issued its initial catalogue. The company has not yet reached its second anniversary, but its patronage extends to the limits of the continent, as is shown by a large number of name plates illustrated in the catalogue now ready for distribution.

THE SWEDISH-AMERICAN TELEPHONE COMPANY, Chicago, whose advertisement appears on page 21 of this issue, was among the leading exhibitors at the Iowa state convention held at Des Moines March 8, 9 and 10. The exhibit was in Parlor "E," being represented by E. B. Overshiner, F. M. Ferguson and R. L. Scott. It was a case of follow the crowd to Parlor "E."

COPPER GOSSIP, published by the National Conduit and Cable Company, 41 Park row, New York, continues to give in each issue much valuable information on copper. Exchange managers who want to keep posted should write and have the publication sent regularly. The National Conduit and Cable Company will be glad to enter such names on its list for free subscription.

THE VIADUCT MANUFACTURING COMPANY, Baltimore, Md., was fortunate in having its factory outside the fire zone which destroyed many of the business buildings of that city. This company's works is in complete running order and is turning out a large number of telephones, district

messenger boxes, switchboards, resonators for telegraph operators, etc. All orders will be promptly filled as usual.

THE WESTERN TELEPHONE MANUFACTURING COMPANY desires to advise its customers and friends that its factory will be removed from Winthrop Harbor to Chicago, where it will be in operation by March 15, prepared to produce a better class of goods than ever and to make prompt shipments to all points. Address all mail and ship all merchandise to 42 West Jackson boulevard, Chicago, Ill.

THE F. BISSELL COMPANY, Toledo, Ohio, is distributing its new bulletin, No. 37, describing a large variety of house goods, illustrating annunciators, bells, push buttons, buzzers, speaking tubes, burglar alarms, electric gas lighting supplies, telegraph apparatus, binding posts, etc. The bulletin is intended to form a part of the company's perpetual catalogue and will be sent upon request to any user of electrical apparatus.

STANDARD TELEPHONE AND ELECTRIC COMPANY, Madison, Wis., will remove from Madison, Wis., to Milwaukee May 1, 1904, and be located at 149-153 Michigan street. Largely increased business makes it necessary to secure additional factory space. The "Standard" has also purchased considerable new machinery to install in the new plant, which will be one of the most modern and fully equipped plants now producing Independent apparatus.

THE CALCULAGRAPH COMPANY, New York, has issued a 16-page pamphlet speaking of the changes in appliances for calculating time. The story begins with the sand glass, talks about the establishment of clocks and their peculiarities and winds up, of course, with a description of the Calculagraph as a time keeper and a calculator. The catalogue is printed in two colors on a good quality of paper and contains copies of testimonial letters from various users.

THE WESCO SUPPLY COMPANY, St. Louis, Mo., will be pleased to send to all of the trade its new catalogue upon request. In addition to the latest market prices on all articles shown in this book there are shown several lines of new goods, and, in addition to this, a copy of the latest rules of the National Board of Fire Underwriters. These rules will be found very useful as a ready reference, and the Wesco company has inserted them for the special convenience of its customers.

THE SWEDISH-AMERICAN TELEPHONE COMPANY, Chicago, whose advertisement appears on page 21 of this issue, has recently closed contracts for the complete equipment of the following Independent organizations: Farmers' Mutual Telephone Co., Detroit, Kan.; Liberty Center Telephone Co., Liberty Center, Ind. Mt. Zion Telephone Co., Mt. Zion, Ind.; Farmers' Telephone Co., Sheridan, Ore.; Tilton Telephone Co., Geneva, Ala.; Lanier Telephone Co., Hartford, Ala.

"TWENTIETH CENTURY MONEY LAW" is the title of a recent publication from the press of Peter Eckler, 35 Fulton street, New York. The work was written during the years 1897-98-99 by Timothy Wright and has been issued by his daughter, Rose Wright Rogers, wife of Oscar Wentworth Rogers. The volume is dedicated to "all laborers" and is therefore of interest to the masses. It contains a wealth of thought on a subject that appeals to everybody, and should command a large sale.

THE STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, Rochester and Chicago, has recently issued a calendar for 1904, which is one of the handsomest of the year. An original photograph of a fair telephone user is paneled on each calendar. These calendars are much sought after, but owing to their high cost the company will send them to heads of telephone companies upon receipt of ten cents in stamps. The calendar is a work of art and is well worth having.

THE CENTRAL TELEPHONE AND ELECTRIC COMPANY, 909 Market street, St. Louis, Mo., has issued its World's Fair art catalogue, No. 18, of telephone instruments and switchboards. The various styles of instruments manufactured by this company are clearly illustrated and their special features briefly described. On the right-hand pages are shown views of the different principal buildings of the World's Fair. There are also shown some examples of the statuary used in the adornment of these structures. The catalogue will be sent upon request.

THE MANHATTAN ELECTRICAL SUPPLY COMPANY, New York and Chicago, in its catalogue No. 16, just issued, shows a very extensive and varied line of electrical apparatus. About everything excepting dynamos is embraced in the list, which includes a very complete line of telegraph, telephone, electric light and construction supplies and novelties. Fan motors of different standard makes are also given due prominence. The catalogue is very comprehensive in scope and it is surprising how much can be concentrated in 80 pages. It is very completely illustrated and gives the prices of the multitude of articles described.

THE CURRENT ELECTRIC COMPANY, Chicago, reports a large sale for the Harter ringer. Sales have been made in every state in the Union and the users are more than pleased. The following letter of date February 23 shows how this companys ringers are working:

"Current Electric Company, Chicago: Inclosed find voucher for $11.76 in payment of invoice of February 13, less discount of two per cent. The ringer works good.

"UNION TELEPHONE COMPANY,

The company invites correspondence and will send full information and prices on its product.

THE FOLLOWING IS A LIST of small exchange switchboard shipments made recently by the American Electric Telephone Company, Chicago: Adrian, Mich., one 100-line express; Belize, British Honduras, C. A., one 200-line express; Monclova Coah, Mexico, 2,100-line express; Elk City, Okla., one 200-line express; Richmond, Mo., one 50-line express; Three Lakes, Wis., one 25-line express; Muscatine, Iowa, two 160-line express Frankford, S. D., one 100-line express; Kenton, Ohio, one 100-line express; Topeka, Kan., one 50-line express; Rockville Center, L. I., N. Y., one 25-line express; Monroe, Neb., one 100-line express; Ann Arbor, Mich., one 100-line express; Lebs, Kan., one 100-line express; Olivet, Kan., one 100-line express; Dunlop, Iowa, one 200-line express.

THE STERLING ELECTRIC COMPANY, Lafayette, Ind., reports an unusual business in its solid-back long-distance transmitters for toll lines, magneto exchanges and common battery exchanges. These transmitters are the result of three years' experimenting and test. The Seymour Home Telephone Company is installing a 500-line board of the new lamp signal type Sterling switchboard. The popularity of the new spring clamp line fuse for cable protection, manufactured by the Sterling Electric Company, is evidenced by the constantly increasing business reported by this company for these devices. The company has just placed upon the market two new subscribers' station protectors for the protection of telephones, one consisting of heat coil and carbons and one of heat coils only. They are a very efficient protector and recommend themselves to the trade on account of their efficiency and cost. The company

has just completed the installation of common battery multiple equipments at Gainesville, Texas; Denton, Texas; Springfield, Ohio, and Elyria, Ohio, and report a good demand for this class of work for the coming year.

THE CHICAGO WRITING MACHINE COMPANY, 87 Wendell street, Chicago, reports a phenomenal sale of Adjustaphones since the opening of the spring business. At the recent conventions at Milwaukee, Cincinnati and Des Moines the delegates expressed their unqualified approval of the instrument and showed their appreciation of its valuable points by leaving substantial orders with the company's representative. A number of the old exchange managers who had simply put in a sample instrument to test have decided to install Adjustaphones in place of the old-style desk sets, and many of them have ordered in large quantities. In several instances the managers announce that a nominal charge will be made for these instruments. As the Adjustaphones are said to greatly decrease the cost of maintenance.

THE INTERNATIONAL TELEPHONE MANUFACTURING COMPANY, Chicago, has recently doubled its manufacturing plant to promptly fill the rapidly increasing orders for its improved line of apparatus. It has added considerable new machinery, including a number of four-spindle heavy drill presses, Brown & Sharpe full automatic screw machines, etc. The plant is equipped with a full complement of special tools, dies, etc., for manufacturing every distinct part of a complete multiple switchboard system for central energy or generator-call telephones, a full line of telephones and improved combination self-restoring drop and jack express type switchboards. It is said that wherever the International equipment has been introduced it is meeting with marvelous success and the company is now prepared to meet the constantly increasing demand.

AN INDIANA COMPANY.

The Indianapolis Arm Bracket and Pin Company of Madison, Indiana, was embarrassed by the failure of another concern and a receiver was appointed. It is said the company will be reorganized. The following from the Madison Democrat of March 9 seems to show the condition of affairs:

This morning Ben T. Head, cashier of the People's bank, was appointed receiver of the Arm & Pin Factory, located on First St. Mr. Head immediately gave bond for $25,000 as receiver and took charge of the plant.

The plant is in a good condition, but owing to the failure of one of its managers debtors closed in on the concern and compelled the appointment of a receiver. The concern is really solvent.

The capital stock is $20,000 and the visible assets, including buildings, machinery and stock on hand, the latter alone valued at from $2,000 to $3,000, are between $10,000 and $15,000. The liabilities are only about $5,200.

The plant will go ahead under receiver Head's management at once. Madison employes will not suffer, but work will be continued. In the meantime, as soon as settlement can be effected the company will be reorganized under Mr. A. F. Potts, a capitalist of Indianapolis, rendering it stronger and more permanent than ever. Madison, as well as those directly interested are fortunate in Mr. Head's appointment and the assurance that the plant will go ahead turning out work as usual.

UNDERGROUND CABLES IN BALTIMORE FIRE.

The Baltimore fire has been the unfortunate means of settling many disputed points for the engineers of this country, and it has, among other points, emphasized most forcibly, in the minds of interested observers, the superiority of underground cables for electrical transmission as compared with old overhead methods.

The Standard Underground Cable Company has installed in Baltimore during the last few years many miles of underground cable in the municipal subway for the Western Union and Baltimore and Ohio Telegraph companies, the Maryland Telephone Company, the city fire and police departments and the United Railway and Electric Company. The main conduit lines run the entire length of the burned district and the manhole covers were in many cases covered with piles of hot brick and stone to a depth of twenty feet.

In spite of the intense heat, there is so far as is known not a single instance of trouble on the cables in manholes or subway, except where exposed ends of cables were destroyed by the fire, and the cable system is in perfect condition to-day.

Two three-conductor cables installed for the United Railway and Electric Company over a year ago, and which terminated in the new and unburned portion of the Pratt street power house, extended the entire length of the burned district and were carrying current to the substation at 13,000 volts the second day after the fire without any interruption to service. This record compared with the ruin of overhead construction, which was universal, certainly gives food for thought to all users of wire.

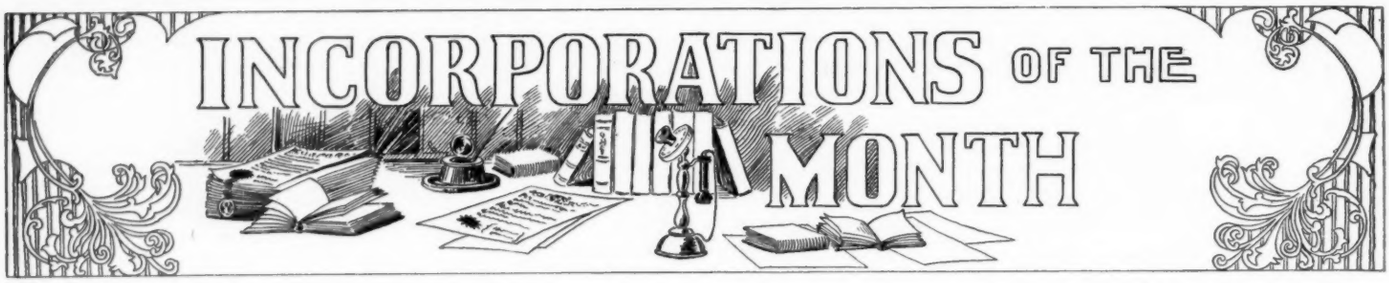
WESTERN LONG-DISTANCE TELEPHONE MERGER

A consolidation of all Independent long-distance telephone companies operating in Ohio, Indiana, Illinois and Missouri, forming a chain from Cleveland to St. Louis, is the promised result of a meeting held in Indianapolis on March 19th by a number of the most prominent Independent telephone men in the central states. The formulating of plans and the discussion of means to the proposed merger took place in executive session, but it was given out that an arrangement had been agreed upon between the various Independent companies whereby they will use each other's lines for long-distance service in other states, and that when necessary short connecting lines will be built so as to put into effect the co-operative service.

It is understood that the United States Telephone Company of Cleveland, over whose lines the traffic of numerous Independent telephone companies is carried on, is backing the plan, although the idea was first conceived by Mr. S. P. Sheerin of Indianapolis, who called the meeting. The principal companies to the merger are: Independent Long Distance Company of Missouri, Kansas City; Home Telephone Company, Louisville; the United States Telephone Company, the Pittsburg and Allegheny Telephone Company, the New Long-Distance Telephone Company, the Cuyahoga Telephone Company of Cleveland, the Citizens' Telephone Company of Columbus, Ohio, the United Telephone Company of Bluffton, Ind., the Indianapolis Telephone Company and the Kniloch Telephone Company of St. Louis. It is now pretty generally believed that the formation of the Indianapolis Telephone Company recently was the preliminary step in the merging of the companies named for the purposes in view.

The following representative telephone men attended the meeting, and at its close were the guests of the officials of the New Long-Distance Company at dinner at the Columbia Club: Maxime Reber, James B. Hoge and F. S. Dickson of Cleveland, James E. Brailey of Toledo, C. M. Foster, C. H. Ledlie, Breckinridge Jones, W. D. Othwine, August Gehner, W. F. Nolker, Philip Stock, J. I. Drummond, Philip Scanlon, H. L. Reber, W. H. Bassett, E. B. Denison, W. R. McCanne and D. W. Pitman of St. Louis, J. D. Powers, J. A. Armstrong, M. Tetu and M. R. Brailey of Louisville, J. C. Splain of Pittsburg, Hugh Dougherty of Bluffton, C. F. Ramsey of Crawfordsville, S. P. Sheerin and H. B. Sales of Indianapolis.

I received specimen copy of TELEPHONY, as requested, and must say it was the biggest "something for nothing" I ever got. Inclosed find money order for $2.00 for one year's subscription for E. R. Briggs and one year's subscription for myself.—H. O. WOODWARD.



L. Atwood, J. S. Warner, Moses Shire.

Citizens' Telephone Company, Mitchell, S. D.

Llewellyn Telephone Company, Llewellyn, Oregon.

Plymouth Telephone Company, Plymouth, Ill., organized.

Lake Shore Telephone Company, Mt. Auburn, Ia., organized.

Hammondsport and Wayne Telephone Company, Hammondsport, N. Y.

Goddard Telephone Company, Goddard, Kans. Capital stock, $2,500.

Ida Mutual Telephone Company, Narka, Kans. Capital stock, $1,000.

Conway Rural Telephone Company, Conway, Mo. Capital stock, $10,000.

Tri-county Telephone Company, Lake, Ohio. Capital stock, $10,000.

Arbela Universal Automatic Wireless Telephone Company, Arbela, Mo.

The Rock and Minnehaha Telephone Company, Booge, S. D., organized.

Adamsville Telephone Company, Adamsville, Ohio. Capital stock, $1,000.

Algansee Telephone Company, Algansee, Mich., organized. Capital stock, $5,000.

Memphis Telephone Company, Memphis, Mich., organized. Capital stock, $1,000.

Indianapolis Telephone Company, Indianapolis, Ind. Capital stock, $1,200,000.

Glasco Telephone and Telegraph Company, Glasco, Kans. Capital stock, $6,000.

Reading Township Telephone Company, Ireton, Ia., organized. Capital stock, $1,700.

Springfield Township Rural Telephone Company, Brittain, Ohio. Capital stock, $10,000.

Moundridge Telephone Company, Moundridge, Kans., organized. Capital stock, $2,500.

Wright County Telephone Company, Waverly, Ia., organized. Capital stock, $50,000.

Palouse Deep Creek Telephone Company, Palouse, Wash. George H. Sawyer, president.

Dundee, Rock Stream and Reading Center Telephone Company, Dundee, N. Y., organized.

Thompson, Caldwell and Wilson Rural Telephone Company, Brookings, S. D., organized.

Reese Mill Co-operative Telephone Company, Lebanon, Ind., organized. Capital stock, $1,000.

Festus Telephone Company, Hillsboro, Mo. Incorporators, F. W. Brickey, W. F. Holt and others.

Farmers' Independent Telephone Company, Caldwell, Ohio, organized. Capital stock, $10,000.

Southern Telephone Company, Abbyville, Kans., organized by Dave Davis, F. Birket and others.

Farmers' Mutual Telephone Company, Liberty Center, Ohio, organized. A. C. Clinton, president.

Demopolis Telephone Company, Demopolis, Ala. Incorporators: B. McCarty, N. L. Lee, L. L. Lee.

Anchor Telephone Company, Anchor, Ill. Incorporators, Jacob Morten, J. F. Ward, J. H. Nefziger.

Pike Telephone Company, Pike, N. Y. Capital stock, $1,000. Incorporators, G. S. Van Girder, H. C. Lathrop.

Hyden Telephone Company, Barbourville, Ky., organized. R. M. Jackson, treasurer; John Woodard, manager.

North Fort Telephone Company, McDonalds Mills, Va. Capital stock, $500 to $5,000. A. P. Bennett, president.

Maumee Valley Telephone Company, Perrysburg, Ohio. Capital stock, $15,000. Directors, N. L. Hanson and others.

Ash Valley Telephone Company, Larned, Kans. F. B. Nichols, president; A. L. Scott, secretary; F. D. Nichols, J. G. Edwards, A. B. Lovett, E. Batholomew, L. W. Krieger, J. W. Line, A. L. Scott, directors.

Pecos Valley Telephone Company, Roswell, N. M. Capital stock, $50,000. Directors, J. W. Poe, R. Chaves and others.

Piles Grove Telephone Company, Woodstoon, N. J. President, Geo. W. Waddington; secretary, Charles F. Pancoast.

Abingdon and Hermon Telephone Company, Abingdon, Ill. Incorporators, Jasper Bond, John W. Head, Cyrus Davis.

Troy Telephone Company, Troy, S. C. Capital stock, $1,500. Incorporators, A. J. Davis, John C. Kennedy, W. H. Robison.

Co-operative Telephone Company, Camden, Ind. Capital stock, $4,000. Directors, J. S. Plank, F. G. Armick, O. W. Wyatt.

Troy Telephone Company, Troy, Ill. Capital stock, $10,000. Incorporators, J. H. Steinhaus, J. W. Gornet, Chris Busse, Jr.

Arcadia Telephone Company, Arcadia, Ind. Capital stock, $25,000. Incorporators, H. L. McCubbin, P. Carrasco, J. Mills.

Glidden Telephone Company, Glidden, Wis. Capital stock, $24,000. Incorporators, J. R. Whittaker, W. L. Schupper and others.

Smithfield-Buckrun Telephone Company, Princeton, W. Va., organized by G. W. Adkinson, Chas. Adkinson, R. L. Ensminger.

Plymouth Telephone Company, Plymouth, Me., organized. Capital stock, $10,000. President, A. O. Ward; treasurer, W. G. Loud.

Sangamon Telephone Company, Williamsville, Ill. Capital stock, $2,500. Incorporators, J. M. Cooper, P. J. Telfer, R. U. Richardson.

Treadwell Telephone Company, Treadwell, N. Y. Capital stock, $3,000. Incorporators, Robert B. Ballentine, Duane D. Wheat, V. R. Ogden.

Farmers' New Era Telephone Company, Hebron, Ill. Capital stock, $5,000. Incorporators, George Hunt, L. A. Nichols, J. H. Turner.

Edwards County Mutual Telephone Company, Albion, Ill. Capital stock, $8,000. Incorporators, Philip King, W. J. Reid, T. B. Mitchell.

Somerset Farmers' Co-operative Telephone Company, Skowhegan, Me., organized. Clarence Rogers, president; C. L. Holbrook, treasurer.

Lost Valley Telephone Company, Goshen, Ore., organized. President, J. M. Parker; secretary, Jennie Parvin; treasurer, William Williams.

Waldo Telephone Company, Waldo Ohio. Capital stock, $25,000. Incorporators, W. Klingel, A. Osborn, M. Lewis, W. D. Kramer, S. Schwader.

Menno-Wittenberg Telephone Company, Menno, S. D., organized. S. S. Rames, manager; M. H. Clagett, secretary; Chr. Aisenberry, treasurer.

Ackerman-Boland Telephone Company, Chicago, Ill. Capital stock, $6,000. Incorporators: Charles Ackerman, J. F. Boland, J. W. Liggett.

Electric Telephone Company, Stewart, Minn. Incorporators, Henry E. Posely, Edward M. Schmidt, Edward Reinhardt, Frances A. Schmidt.

Ayrshire Farmers' Telephone Company, Ayrshire, Ia., organized. President, Goodman Lee; secretary, Frank McCormick; treasurer, Rex Meek.

Phelps County Telephone Company, Holdredge, Nebr. Capital stock, $40,000. Incorporators, C. C. Flansburg, F. W. Barber, J. F. Butterfield.

Conesville and Gilboa Telephone Company, Conesville, N. Y. Capital stock, $1,000. Incorporators, J. W. Gaylord, B. C. Wright, Elmer Baker.

Faller Automatic Telephone Company, New York, N. Y. Capital stock, $10,000. Directors, J. W. Chisholm, E. A. Faller, Clarkson Clothier.

Launt Hollow Telephone Company, Hamden, N. Y. Capital stock, $800. Incorporators, R. J. Andrews, Edwin Signor, J. L. Wannemaker.

Hermon and St. Augustine Telephone Company, Hermon, Ill. Capital stock, $1,000. Incorporators, F. A. Bogan, G. H. Brown, George Castle.

Mexico Home Telephone Company, Mexico, Ind. Capital stock, $3,000. Incorporators, H. C. Strong, John T. Hood, W. N. Fisher, T. H. Ireland.

Wheatland Telephone Company, Breda, Iowa, organized. Emil Meyer, president; H. Van Glau, vice-president; G. Aen, secretary and treasurer.

Hay Springs Alcove Telephone Company, Hay Springs, Nebr. Capital stock, $2,000. Incorporators, G. A. Waterman, W. R. Bowman and others.

Camden and West Elkton Telephone Company, Camden, Ohio. President, Wm. Davis; secretary and manager, W. S. Hall; treasurer, W. S. May.

Spencer, Gandeeville and Western Telephone Company, Gandeeville, W. Va. Capital stock, $75,000. Directors, E. Johnson, L. A. Rader and others.

Sherburne Telephone Company, Sherburne, N. Y. Capital stock, $10,000. Incorporators, Jesse H. Shepard, Frederick I. Shepard, George L. Shepard.

Waymer-Moore Company, Tifton, Ga. Capital stock $5,000. Incorporators, F. E. Waymer, Jacksonville, Fla.; F. J. Moore, Briggs Carson, Tifton, Fla.

Saline Telephone Company, Tobias, Nebr. Capital stock, $100,000. Incorporators, Wm. Burke, C. W. Nunnemaker, H. Nunnemaker, A. S. Sands, F. J. Stark.

Arkansas Telephone Company, Dardanelle, Ark. Capital stock, $50,000. Incorporators, J. B. Crownover, W. R. Hayden, A. L. Blackwell and others.

Marion County Co-operative Telephone Company, Salem, Ill. Capital stock, $1,000. Incorporators, Jacob Hershberger, W. J. Martin, D. L. Culver.

Fountain Creek Telephone Company, East Lynn, Ill. Capital stock, $34,000. Incorporators, William A. Yeazel, George H. Wieland, Henry H. Tucker.

Morning Star Telephone Company, English, Ind. Capital stock, $5,000. Directors, Joseph Allen, W. H. Williams, W. J. Trusty, C. E. Newkirk, G. W. Wilson.

The Terhune Co-operative Telephone Company, Terhune, Ind. Capital stock, $400. Directors, Albert Robison, Simon Cox, Francis M. Lovell, Ira S. Kimble.

Elberfeld and Millersburg Telephone Company, Elberfeld, Ind. Capital stock $450. Incorporators, Dr. L. Brown, Fred Rampke, Henry Menke and others.

Jasper and Canisteo Telephone Company, Jasper, N. Y. Capital stock, $300. Incorporators, Willis A. Schency, Dr. Walter Benedict, Jasper; Ray Jamison, Canisteo.

Ravenna Telephone Company, Ravenna, Nebr., organized. J. F. Adamson, president; Chet Holloway, vice-president; C. F. Carlos, secretary, treasurer and manager.

Cheshire Telephone Company, Cheshire, Ohio, organized. J. H. Reynolds, president and secretary; Hollis Boice, vice-president and manager; H. H. Roush, treasurer.

Brown County Telephone Company, Georgetown, Ohio. Capital stock, $20,000. Incorporators, E. Bare, W. J. Marshall, H. C. Landon, G. Bambach, J. C. Martin.

Cass County Telephone Company, Harrisonville, Mo. Capital stock, $50,000. Incorporators, W. B. Scruggs, R. W. Adams, Duston Adams, W. H. Scruggs, H. B. Moody.

Getaway Telephone Company, Getaway, Ohio, organized. Capital stock, $5,000. Incorporators, J. E. Schneider, J. W. Gerlach, W. W. Poindexter, W. T. Cox, G. W. Thader.

Elk City Northern Telephone Company, Carpenter, Okla. Capital stock, $5,600. Incorporators, Joseph A. Mead, J. A. Hart, S. J. Tippins, Joseph I. Brothers, D. L. Clifft.

Middletown Home Telephone Company, Dayton, Ohio. Capital stock $10,000. Incorporators, Albert Emanuel, Charles H. Bosler, N. P. Ramsey, R. E. Kline, H. P. Miller.

Citizens' Mutual Telephone Company, Dana, Ind. Capital stock, $600. Stockholders: Dewitt C. Kern, Henry Boles, S. E. Scott, Daniel Finney, J. W. Redman and others.

Warren Telephone Company, Warren, Ind. Capital stock, $25,000. Stockholders, George Griffith, Frank Canaday, S. W. Pulley, David Griffith, George D. Kreigbaum.

Pleasant Ridge Telephone Company, Castalia, Ia. A. W. Oxley, president; H. L. Meyer, secretary and treasurer; D. C. Harvey, Elmer Ross, Ambrose McGaheran, directors.

Jacksonville Telephone Company, Jacksonville, Ark. Capital stock, $1,000. Incorporators, S. W. Murtishaw, W. G. Graham, E. McBridge, R. C. Stone, Mrs. Emma Martin.

Western Dixie Telephone Company, Vale, Tenn., organized. President, L. M. Allen; vice-president, J. W. Gerrard; secretary, A. L. Hustead; treasurer, Henry A. Swiger.

Boston Valley Telephone Company, Boston, N. Y., organized. Fred Frank, president; Philip D. Weber, vice-president; Frank Weber, secretary; Jacob Brodbek, treasurer.

Automatic Telephone Equipment Company, New Bedford, Mass. Incorporators, Charles E. Hellier, Frank E. Sweetser, Charles B. Price, Benjamin E. Waters, William S. Greene.

Liberty Center Telephone Company, Liberty Center, Ind. Capital stock, $2,500. Incorporators, James P. Mounsey, Lewis A. Minniear, Orin B. Garrett, Joseph Stahl, George M. Gavin.

Missouri River Telephone Company, St. Joseph, Mo. Capital stock, $150,000. Directors, Walter S. Dickey, William F. Rankin, Frank S. Travis, John R. Stafford, Ralph C. Stauber.

Kurtz International Telephone Company, Washington, D. C. Capital stock, $10,000,000. Incorporators, J. W. Kurtz, J. A. Thompson, Harvey T. Winfield, Joseph A. Rath, Charles Fitts.

Franklin Center Mutual Telephone Company, Caloma, Ia. Capital stock, $2,500. Incorporators, C. M. Vanzee, D. D. Marsh, C. E. Smith, W. F. Dangerbartaes, C. F. Kading, A. C. Niles.

Newark Telephone Exchange, Newark, N. Y. Capital stock, $25,000. Directors, W. H. Kelly, J. R. Pulver, E. A. Smith, E. P. Thatcher, J. P. Ballou, F. D. Burgess, Albert Proseus.

Laddonia, Rush Hill and Mexico Union Telephone Company, Laddonia, Mo. Capital stock, $1,000. Incorporators, J. N. Rosser, M. A. Featz, C. L. Steward, J. C. Maxwell, T. J. Roberts.

Farmers' Mutual Telephone Company, Grand Mound, Ia. Capital stock, $4,000. President, Albert A. Barber; vice-president, W. E. Cook; secretary, John Meints; treasurer, Albert F. Barber.

Farmers' Co-operative Telephone Company, Wilkinson, Ind. Capital stock, $1,000. Directors, Samuel M. Overman, Robert E. Simmons, John W. Noland, Jesse Tuterow, Benjamin H. Cook.

Warner Telephone Company, Gowanda, N. Y. Capital stock, $50,000. Directors, Thaddeus S. Lane, A. S. Warner, William S. Lawton, Franklin M. Bard, Herbert S. Sisson, E. C. Mugridge, H.

Missouri Valley Long Distance Telephone Company, Norborne, Mo. Capital stock, $25,000. President, H. W. Tull; vice-president, A. B. Hughes; secretary, F. G. Taggart; treasurer, H. H. Wilcoxson.

Farmers' and Merchants' Telephone Company, Lena, Wis., organized. Capital stock, $4,000. President, J. N. Bassett; vice-president, J. P. Brazeau; secretary, J. L. Echter; treasurer, J. C. Grant; manager, Frank Redman.

Montrose Telephone Company, Montrose, Minn. Capital stock, $10,000. Incorporators, C. A. Stalzman, A. C. Strey, F. W. Swanson, F. E. Belden, C. P. Stapleton, J. P. Thornquist, Louis F. Miller, F. G. Miller, C. F. Denoon.

Salamonia Telephone Company, Salamonia, Ind. Capital stock, $2,500. Incorporators, Henry E. Bartling, J. J. Kidder, Adam Lee, J. M. McKinley, C. V. Skinner, W. A. Chew, C. A. Armstrong, J. E. Andrews, John W. Cull.

Polk County Telephone Company, Polk, Ia. Capital stock, $3,000. Incorporators, Ed Miller, C. A. Snow, R. H. McLean, C. A. Horner, F. D. Bryant, R. Sutter, A. C Huston, C. W. Tyler, C. A. Becker, James Stippich, Lewis Suiter, G. Crabtree, H. Matter.

Farmers' Mutual Telephone Company, Russell, Ia. Capital stock, $10,000. Incorporators, J. Q. Werts, C. D. Smith, W. A. Elliott, F. H. Tinker, Frank Youtsey, M. F. Chapman, S. O. Slater, M. C. McKinley, J. H. McKinley, Charles Larue, J. A. Vinsell, S. Littleton.

Pioneer Telephone and Telegraph Company, Oklahoma City, Okla. Capital stock, $3,000,000. Incorporators, John M. Noble, Oklahoma City; James V. Noble, Shawnee; E. D. Nims, Muskogee, I. T.; Henry E. Asp, Guthrie; George W. Barnes, Toledo, Ohio; David McKinistry and E. E. Westervelt, Perry, Okla.

ANNUAL MEETINGS.

COLORADO.

NEWCASTLE—The Garfield County Telephone Company has elected officers as follows: William Chadwick, president; F. E. Clarkson, vice president; W. D. Lockard, secretary; J. A. McRae, treasurer; J. S. Kass, general manager.

FORT MORGAN—The Fort Morgan Telephone Company has elected officers as follows: W. H. Clatworthy, president; R. M. Hancy, secretary; Arthur Hotchkiss, Jr., treasurer; L. C. Stephenson, general manager.

FLORIDA.

LAKE CITY—The Columbia Telephone Company has elected officers as follows: W. N. Shine, president; M. M. Scarborough, vice president; M. A. Shine, treasurer.

ILLINOIS.

DUQUOIN—The DuQuoin Telephone Company has elected the following officers for the ensuing year: H. C. Miller, president; Dr. C. M. Brookings, vice president; Mr. Aldridge, manager and secretary.

TUSCOLA—The Douglas County Telephone Company has elected

officers as follows: George Calloway, president; J. B. McMillen, vice president; J. H. Culver, secretary; A. W. Wallace, treasurer; J. B. McMillen, J. H. Culver, George Calloway, directors.

RUTLAND—The Central Illinois Independent Telephone Company has elected the following officers for the ensuing year: J. S. Webber, president; F. Z. Ames, secretary and treasurer; G. A. Sauer, treasurer.

ROCKFORD—The Winnebago County Telephone Company has elected the following officers: B. E. Collins, president; C. F. Tritle, vice president; H. S. Hicks, secretary; Chas. Starr, treasurer; D. W. Barningham, manager.

MARSEILLES—The Marseilles Telephone Company has elected officers as follows: Dr. M. E. Blanchard, president; E. H. Spicer, vice president and manager; L. M. Jennings, secretary; Wm. H. Spicer, treasurer.

INDIANA.

CONNERSVILLE—The Connersville Telephone Company has elected George M. Sinks, president; W. T. Edwards, vice president; L. A. Frazee, secretary and treasurer.

RICHMOND—The Richmond Telephone Company has elected the following directors for the ensuing year: A. C. Lindemuth, F. H. Cates, Samuel Dickinsin, J. W. Moore, J. M. Lontz, L. M. Flesh, W. P. Orr. A. C. Lindemuth, president.

IOWA.

ADAIR—The Adair and North Branch Telephone Company has elected officers as follows: Q. Beck, president; M. T. Bascom, secretary; W. E. Lower, treasurer.

IOWA FALLS—The Central Iowa Telephone Company has elected the following officers for the ensuing year: J. R. Skinner, president; J. H. Funk, vice president; W. F. Brocksmith, secretary and general manager.

SPENCER—The Spencer Telephone Company has elected officers as follows for the ensuing year: A. W. Greene, president; J. F. Hirleman, secretary; A. W. Greene, E. L. Dickey, H. A. Pitcher, J. F. Hirleman, C. W. Greaves, directors.

DOWNEY—The Downey Mutual Telephone Company has elected officers for the ensuing year as follows: Irve Compton, president; Newt Snyder, vice president; Geo. Cornwall, secretary; Wilson Ervin, treasurer; Walter Mackey, superintendent; directors, H. K. Gates, George Gates, Wm. Jenkinson.

JORDAN—The Excelsior Telephone Company has elected officers as follows: J. L. Brown, president; F. D. Harmon, vice president; W. T. Boyd, secretary and treasurer.

SPENCER—The Northern Telephone Company has elected the following officers: A. W. Greene, president; J. T. Goldsworthy, vice president; B. D. Dunning, treasurer; G. W. Greaves, secretary.

GALVA—The Galva Telephone Company has elected the following officers for the ensuing year: Robert Baxter, president; George Clapsaddle, vice president; George Whealan, treasurer; H. M. Walters, secretary.

LADORA—The Ladora County Telephone Company has elected the following officers: J. N. Shedenhelm, president; M. A. Wright, vice president; W. M. Blair, secretary; W. G. Blair, treasurer.

IOWA CITY—The Pleasant Valley Mutual Telephone Company has elected the following officers for the ensuing year: J. E. McCollister, president; Phillip Reilly, vice president; Lewis W. Miller, secretary; John A. Goetz, treasurer; Abe Plum, director.

VAN WERT—The Van Wert Rural Telephone Company has elected officers as follows: F. L. Hall, president; J. F. Hocker, vice president; H. O. Tuttle, secretary; F. O. Stearns, treasurer; C. C. Waters, J. Ed. Pierce, W. F. Blair, J. F. Howell, J. F. Rumley, directors.

DAVENPORT—The Davenport and Kiowa Telephone Company has elected officers as follows for the ensuing year: C. J. Lichty, president; A. M. Miller, vice president; John Rodenburg, treasurer; A. J. Croft, secretary; John Heimsoth and E. Sedgwick, directors.

WEST LIBERTY—The West Liberty and Springdale Mutual Telephone Company has elected the following officers: Frank T. Gibson, president; Ross Mountain, vice president; Dr. F. H. Battey, secretary and treasurer; E. Fogg, trustee.

MAPLETON—The Maple Valley Telephone and Telegraph Company has chosen officers as follows for the ensuing year: W. H. Leathers, Mapleton, president; J. C. Hammond, Mapleton, vice president; C. H. Smith, Odebolt, secretary; T. B. Lutz, Mapleton, treasurer; Charles G. Cockerill, W. B. Booker, C. I. Whiting, directors.

TIPTON—The Davenport and Tipton Independent Telephone Company has elected officers as follows: H. R. Chapman, president; H. N. Meewes, vice president and general manager; R. A. Nash, secretary and treasurer; J. H. Coults, F. S. Willex, J. W. Heuer, E. T. Jockheck, directors.

LESLIE—The Leslie Telephone Company has elected officers as follows: G. W. Gardiner, Osceola, president; E. T. Barrett, Leslie, vice-president; F. M. Kennedy, Osceola, secretary; T. F. Johnson, Leslie, treasurer; G. W. Gardiner, C. H. Hodges, E. T. Barnett, Oscar Yates, T. H. Swain, directors.

PLEASANT PLAIN—The Pleasant Plain Telephone Company has elected Jervis Haney, president; J. T. Ellyson, secretary and treasurer.

WEBSTER CITY—The Hamilton County Telephone Company has elected the following officers for the ensuing year: D. C. Chase, president; A. M. Johnson, vice-president; K. W. Lee, secretary; John A. Wilke, treasurer.

BLOOMFIELD—The Citizens' Telephone Company has elected the following officers for the ensuing year: N. H. Sheppard, president; C. C. McVay, vice-president; C. D. Evans, secretary; L. F. Christy, treasurer; S. S. Stanley, C. E. Stockham, J. T. Hill, C. K. Gleason, D. W. Hartzler, C. C. McVay, F. S. Stockton, Evan Evans, J. W. Dumfriend, directors.

KENTUCKY.

ELK CITY—The Taylor and Bethlehem Telephone Company has elected officers for the ensuing year as follows: William V. Wiggington, president; William McMakin, secretary and treasurer; J. L. Long, general manager.

LEXINGTON—The Fayette Home Telephone Company has elected the following officers for the ensuing year: George S. Shanklin, president; A. Smith Bowman, vice-president; J. Will Stoll, treasurer; Charles Kerr, secretary.

BOWLING GREEN—The Home Telephone Company has elected officers as follows: Nerge Clark, president; F. B. Stout, vice president; J. W. Whitpotter, secretary and treasurer.

OWENSBORO—The Home Telephone Company has elected officers as follows: J. W. Slaughter, president; J. W. Carter, vice president; H. K. Cole, secretary and general manager; James H. Parrish, treasurer.

KANSAS.

OSBORNE—The Osborne-Cheyenne Telephone Company has elected officers as follows: Jasper Rodgers, president; C. W. Stansberry, vice-president; B. F. Hilton, secretary; I. L. DeMoss, treasurer.

MAINE.

LEWISTON—The Lewiston and Green Telephone Company has elected the following officers: R. Alden, president; Harry Merrill, clerk; H. M. Blake, treasurer.

PORTLAND—The Northeastern Telephone Company has elected the following officers for the ensuing year: Thomas R. Brooks, president; Lewis A. Goudy, vice-president and general manager; Edwin W. Gearhart, treasurer; Oscar H. Hersey, clerk; Alfred L. Durgan, superintendent.

HARMONY—The Harmony and Wellington Telephone Association has elected officers as follows for the ensuing year: W. G. Bailey, president; G. D. Magoon, vice-president; H. C. Hurd, secretary; F. J. Tibbetts, treasurer; Charles Bean, general manager.

MINNESOTA.

FAIRMONT—The Fairmont Telephone Company has elected the following officers for the ensuing year: W. W. Ward, president; P. R. Matson, vice-president; David S. Wade, secretary and treasurer.

PRINCETON—The Minnesota Rural Telephone Company has elected Dr. Armitage, president and secretary; W. G. Armitage, vice-president; L. Erickson, treasurer.

HUTCHINSON—The Hutchinson Telephone Exchange Company has elected officers as follows for the ensuing year: W. E. Harrington, president; W. E. Sivright, vice-president; H. L. Merrill, secretary; Wm. Davidson, treasurer.

CLINTON FALLS—The Clinton Falls Rural Telephone Company has elected officers as follows: F. W. Adams, president; A. O. Newhall, secretary; C. M. Finch, treasurer.

LESLIE—The stockholders of the Leslie Rural Telephone Company have elected the following officers for the ensuing year: A. Hegland, president; Chris. Heeb, secretary; Jno. E. McKindley, treasurer. Directors, C. S. French, C. W. Bly, A. F. Boorman, J. F. Brown, Henry Caraway.

ACTON—The Acton Telephone Company has elected officers as follows: H. O. Halverson, president; John A. Sampson, vice-president; Even Evenson, secretary; John G. Nelson, treasurer.

HALSTAD—The Farmers' Telephone Company has elected Henry Henderson, president; P. O. Holte, treasurer; A. O. Berum, secretary.

MANKATO—The Minnesota Valley Farmers' Telephone Company has elected the following officers for the ensuing year: Daniel Williams, president; J. H. Doty, first vice-president; James D. Price, second vice-president; David Crane, Robt. S. Hughes, Elliot Upson, David E. Bowen, Wm. S. Hughes, trustees.

STEELE CENTER—The Steele Center Rural Telephone Company has elected W. Kovar, president; James Lynard, secretary; M. D. Whitman, treasurer.

MANKATO—The Mankato and Rapidan Telephone Company has elected officers as follows for the ensuing year: Fred O. True, president; A. L. Veigel, vice-president; C. C. Johnson, secretary; William Jamieson, treasurer. Board of directors, F. Holberg, Geo. Yeager, E. Cragun.

ELGIN—The Elgin Telephone Company has elected officers as follows: Andrew French, president; W. T. Adams, vice-president; T. G. Bolton, secretary; F. D. Washburn, treasurer.

MICHIGAN.

BENZONIA—The Benzie County Telephone Company has elected officers for the ensuing year as follows: W. A. Poung, president and general manager; H. B. Woodward, secretary and treasurer.

SAGINAW—The Valley Telephone Company has elected the following officers: J. E. Davidson, president; John L. Jackson, vice-president; R. T. Johnson, secretary and manager; C. B. Curtis, treasurer.

SAGINAW—The Valley Telephone Company has elected officers as follows: J. E. Davidson, president; John L. Jackson, vice-president; R. F. Johnson, secretary and manager; C. B. Curtis, manager.

MASSACHUSETTS.

GRANBY—The Granby Telephone and Telegraph Company has elected J. J. Bateson, president; W. G. Perry, treasurer and clerk.

MISSOURI.

OZARK—The Christian County Telephone Company has elected the following directors: W. T. Kerr, J. F. Vaughan, S. E. Bronson, W. L. Woody.

FARMINGTON—The Farmington Telephone Company re-elected the following officers for the ensuing year: T. P. Pigg, president and manager; D. F. Glessing, secretary; M. P. Cayco, treasurer.

NEBRASKA.

COLLEGE VIEW—The College View Telephone Company has elected the following officers for the ensuing year: M. W. Newton, president; D. D. Rees, vice-president; Bert Glasscock, secretary; Joseph Nelson, treasurer.

YORK—The York County Independent Telephone Company has elected the following directors: J. Kirkpatrick, E. E. Lincoln, Alfred Christian, J. M. Bell, George Holdeman, Commodore Beaver, Dr. Straight.

COLUMBUS—The Independent Telephone Company has elected the following directors for the coming year: C. J. Carlow, T. J. Cottingham, A. Anderson, G. T. Everett, Albert Kummer, C. J. Carlow, president; T. J. Cottingham, vice-president; A. Anderson, treasurer; G. T. Everett, secretary and manager.

GENEVA—The Fillmore County Telephone Company has elected the following directors: C. H. Brown, C. E. Tilton, E. K. Cobb, T. H. L. Lee, J. H. Lunemann, I. J. Gutchess, John Barsby. C. H. Brown, president; C. E. Tilton, vice-president; E. K. Cobb, treasurer; John Barsby, secretary and general manager.

PLATTSMOUTH—The Plattsmouth Telephone Company has elected officers as follows for the coming year: T. E. Parmele, president; C. C. Parmele, vice-president; T. H. Pollock, treasurer and general manager; J. N. Wise, secretary.

LAWRENCE—The Lawrence Telephone Company has elected the following officers: Henry Gilsford, president; H. P. Bowman, treasurer; J. M. Riley, secretary.

BLAIR—The Blair Telephone Company has elected the following officers and directors for the ensuing year: John McMahon, president; L. E. Ward, vice-president; S. W. Chambers, secretary; Geo. B. Riker, secretary. Directors, Isaac McCann, L. E. Ward, S. E. Hurd, J. H. Jensen, J. McMahon, George B. Riker.

TABLE ROCK—The Table Rock Telephone Company has elected W. C. Fellers, president; William Sutton, vice-president; Dr. W. H. Wilson, second vice-president; Chas. J. Wood, secretary; C. H. Bernard, treasurer.

DESHLER—The Deshler and Kiowa Telephone Company has elected the following officers: E. H. Geisler, president; J. H. Rosenstock, vice-president; Rudolph Koch, secretary; Roy A. Bush, treasurer.

GRANT—The Eckery Telephone Company has elected G. E. Pankonin, president; E. E. Hill, secretary; A. S. Boehmer, treasurer.

CALLAWAY—The Callaway-Arnold Telephone Company has elected the following directors: Alfred Schreyer, C. M. Blowers, George Troyer, O. G. McConnell, John Welland, J. J. Seaney, Charles Engels.

NEW HAMPSHIRE.

WILTON—The Wilton Telephone Company has elected officers as follows: George Bales, president; W. H. Emerson, secretary and treasurer; H. L. Emerson, general manager. Directors, C. E. Bales, H. L. Emerson, W. F. Clark, W. I. Durgin, Dr. C. E. Higgins.

NEW YORK.

ELMIRA—The York State Telephone Company has elected the following officers for the ensuing year: W. D. Barnard, president; Edward Davis, vice-president; Robt. M. Dougal, secretary and treasurer; George B. Wright, general superintendent.

NEWBURG—The Colonial Telephone Company has elected the following officers and directors for the ensuing year: Samuel V. Schoonmaker, president; Wm. George Taggart, vice-president; Harry Bartlett, treasurer; George G. Otis, secretary and general manager. William Wenzel, Wm. D. Coldwell, Chas. L. Robinson, J. Larson, directors.

LYNDONVILLE—The Lakeside Telephone Company has elected W. A. Tuttle, president; F. B. Conde, vice-president; S. A. Coe, secretary and treasurer, for the coming year.

BAINBRIDGE—The Bainbridge Telephone Company has elected officers as follows: James Hyde, president; Erwin Ransdale, vice-president; E. D. Truman, secretary; George L. Lyon, treasurer; Frank C. Smith, general manager; O. L. Crumb, assistant secretary.

UTICA—The Utica Telephone Company has elected officers as follows: Edgar B. Odell, president; H. F. Miller, vice-president; Edward Bushinger, treasurer; C. H. Poole, secretary and manager. Directors, E. B. Odell, H. F. Miller, Ed L. Barber, George R. Fuller, Edward Bushinger, T. H. Ferris, James S. Brailey, Jr., W. I. Taber, C. H. Poole.

BENNETTSVILLE—The Delaware Valley Telephone Company has elected the following officers for the ensuing year: C. P. Teed, president; G. W. Vanderworker, vice-president; Charles Sampson, secretary; George Bilby, treasurer.

CORTLAND—The Cortland Home Telephone Company has elected officers as follows: Dr. C. D. Ver Mooey, president; C. P. Walrad, vice-president; H. L. Smith, secretary; G. J. Mager, treasurer; F. V. Bennett, manager.

PORT JEFFERSON—The North Shore Telephone Company has elected J. H. Davis, president; F. H. Tuthill and W. A. Davis, vice-presidents; Charles V. Platt, secretary; C. A. Squires, treasurer; R. J. Hawkins, attorney.

CANANDAIGUA—The Interlake Telephone Company has elected George R. Fuller, president; Albrecht Vogt, vice-president; J. W. Taylor, secretary and treasurer.

JAMESTOWN—The Chautauqua Telephone and Telegraph Company has elected the following officers for the ensuing year: T. S. Lane, president; G. W. Appleby, vice-president; F. H. Nott, secretary; B. D. Phillips, treasurer.

DELHI—The Farmers' Exchange Telephone Company has elected officers as follows: O. R. Musson, president; C. H. Burgin, vice-president; Charles V. Platt, secretary; C. A. Squires, treasurer; R. Scudder, secretary and treasurer.

MIDDLETOWN—The Orange County Telephone Company has elected Chas. Higham, president; A. B. Wilbur, vice-president; W. C. Ramsdell, secretary.

DARIEN—The Darien Telephone Company has elected D. C. Young, president; Dwight Dimock, vice-president; E. J. Sherin, secretary and treasurer.

EAST CHATHAM—The New Britain Co-operative Telephone Company has elected officers as follows: F. S. Phillips, president; J. G. F. Wadsworth, treasurer; J. A. Kelly, secretary; D. V. Wadsworth, C. H. Carpenter, A. B. Greenman, W. H. Van Vleck, directors.

BYRON—The Byron Telephone Company has elected H. C. Norton, president and manager; Dr. Prince, vice-president; A. G. Steele, secretary; L. W. White, treasurer.

FAIRHAVEN—The Lake Ontario Telephone Association has elected officers as follows for the ensuing year: W. P. Younglove, president; J. M. Phillips, vice-president; F. L. Mixer, secretary; A. Hawley, treasurer; William Hawley, general superintendent.

MIDDLEBURG—The Middleburg Telephone Company has elected Dr. C. S. Best, president; Daniel D. Frisbie, vice-president; Dow Beekman, secretary; J. Edward Young, treasurer; C. W. Vroman, manager.

BUFFALO—The Consolidated Telephone Company has elected the following directors: A. D. Bissell, Charles E. Austin, Martin Carey, J. P. Dudley, B. G. Hubbell of Buffalo; T. S. Fasset, Tonawanda; Charles Adsit, Hornellsville; K. F. Gill, Luther Allen, Cleveland; R. D. Critchfield, Chicago.

NEW KINGSTON—The Bovina and Middletown Telephone Company has elected the following directors: J. W. Eliot, W. F Du Mond, Charles D. Sanford, Henry Hitt, William D. Winter, J. B. Archibald, Sinclair Archibald.

OHIO.

CONNEAUT—The Conneaut Telephone Company has elected the following officers for the ensuing year: H. H. Hunt, president; A. J. Parker, vice-president; G. M. Brown, treasurer.

ELYRIA—The Elyria Telephone Company has elected W. E. Brooks, president; J. A. Dake, secretary and treasurer.

BELMONT—The Belmont Telephone Company has elected the following officers and directors: J. C. Heinlein, president; H. Schumulbach, vice-president; J. C. Dent, treasurer; A. J. Heinlein, H. S. Armstrong, J. W. Doudna, C. L. Weems, directors.

KENTON—The Kenton Telephone Company has elected the following officers and directors: J. L. Moore, president; W. A. Norton, vice-president; A. C. Wessling, secretary and treasurer; H. J. Miller, director.

AKRON—The Akron People's Telephone Company has elected the following officers and directors for the ensuing year: Will Christy, president; C. W. Devoe, vice-president; J. S. Benner, secretary; W. F. Laubach, treasurer and manager; directors, Will Christy, J. R. Nutt, R. M. Fillmore, W. F. Laubach, H. C. Land, C. W. Devoe.

GALION—The Galion Telephone Company has elected officers as follows: Mark Cook, president; A. A. Whitney, vice-president; J. W. Cupp, treasurer; Sol M. Wolf, secretary; R. C. Callaghan, general manager; M. A. Charlton, manager.

HAMILTON—The Hamilton Home Telephone Company has elected officers and directors as follows for the coming year: Frank

Hughes, president; Chas. Griesmer; J. W. Sloneker, secretary; F. W. Whitaker, treasurer; A. B. Crawford, manager; Sam D. Fitton, Sr., J. C. Slayback, F. W. Whitaker, Frank Hughes, Chas. Griesmer, J. W. Sloneker, O. M. Bake, L. P. Clawson, F. M. Barden.

WELLINGTON—The Wellington Telephone Company has elected the following officers: E. C. Branson, president; J. T. Haskell, secretary; H. C. Otterbacher, treasurer.

BELLEFONTAINE—The United Telephone Company has elected the following directors: W. W. Fisher, C. E. Yoder, W. C. Huston, F. M. Johnson, C. H. Wilson, G. M. Stevenson, J. C. Brand, Alfred Butler, R. S. Ciptors, F. N. Gales, Will Harris, A. C. Moore.

FINDLEY—The Farmers' Mutual Telephone Company has elected officers as follows for the ensuing year: Cyrus Ockerman, president; E. H. Losenberg, vice-president; F. F. Robinson, secretary.

TRUMBULL—The Trumbull Telephone Company has elected the following officers: H. H. Townsley, president; F. R. Clarke, secretary; G. H. Clough, treasurer; H. F. Nye, F. Fuller, S. R. Webster, A. Rich, M. W. Bower, F. Hausch, C. Speigel, H. N. Stone, directors.

KYGER—The officers of the Kyger Independent Telephone Company for the coming year are: Dr. Rife, president; W. C. Ely, secretary; M. C. Boise, treasurer.

BENTON RIDGE—The Farmers' Mutual Telephone Company has elected the following officers for the coming year: W. H. Whistler, president; T. G. Clymer, vice-president; P. A. Kemerer, secretary; Daniel Jackson, treasurer; J. P. Baldwin, manager.

WESTON—The Weston Home Telephone Company has elected the following officers: Samuel Murphy, president; George E. Spencer, treasurer; W. E. Deweese, W. R. Swerline, C. K. Ross, Erin Businger, J. E. Clark, directors.

COLUMBUS—The Citizens' Telephone Company has elected the following officers for the ensuing year: Henry Lanman, president; E. R. Sharp, secretary-treasurer; F. A. Beam, manager; F. A Davis, counsel; directors, H. A. Lanman, F. A. Davis, John Joyce, E. R. Sharp, J. D. Critchfield, L. D. Hagarty, J. B. Hanna.

MT. PLEASANT—The Mt. Pleasant Telephone Company has elected the following officers for the ensuing year: Michael Gallagher, president; Dr. J. S. McGleen, vice-president; E. B. Jones, secretary and treasurer; J. M. Bennett, general manager.

CLEVELAND—The United States Telephone Company has elected officers as follows for the ensuing year: F. S. Dickson, president; E. W. Moore, vice-president; James B. Hoge, secretary; R. W. Judd, treasurer. H. A. Everett, J. H. Moore, J. B. Hanna, C. W. Wason, B. Mahler, J. W. Marsh, James B. Hoge, F. S. Dickson, James R. Sprankle, directors.

NEW CONCORD—The Concord Telephone Company has elected the following officers and directors for the ensuing year: S. C. Herdman, president; J. F. McClelland, vice-president; J. B. Rhodes, secretary and treasurer; S. M. Winn, counsel; J. B. Rhodes, S. C. Herdman, J. E. McClelland, S. M. Winn, W. D. Forsyth.

CROOKSVILLE—The Crooksville Telephone Company has elected officers as follows: J. B. Rhodes, president and general manager; H. A. Skidmore, vice-president; William Harris, secretary; J. L. Bennett, treasurer; Thomas P. Wilson, William Harris, J. C. Moore, H. A. Skidmore, J. B. Rhodes, J. L. Bennett, S. R. Souders, directors.

MARIETTA—The Marietta Telephone Company has elected the following officers and directors: A. L. Gracey, president; J. S. H. Torner, vice-president; F. D. Moats, treasurer; A. C. Davis, secretary and general manager. W. H. H. Jett, J. H. Lininger, F. P. Moats, A. L. Gracey, A. C. Davis, J. S. H. Torner.

CANTON—The Starke County Telephone Company has elected officers as follows for the ensuing year: F. S. Dickson, president; R. S. Shields, vice-president; R. W. Judd, treasurer; A. L. Hillhouse, secretary and general manager; Morton Furdue, general superintendent.

MARION—The Marion Telephone ompany has elected F. F. Guthery, president; G. W. King, vice-president; O. Wallenweber, treasurer; D. M. D. Daffer, secretary and general manager.

PENNSYLVANIA.

DELMAR—The Delmar and Hoytville Telephone Company has elected Frank H. Marvin, president; D. S. Fields, secretary; John Focht, treasurer.

POCAHONTAS—The Economy Telephone Company has elected A. G. Yutz, president; Wilson Paul, secretary; S. K. Hochstetler, treasurer.

LOYALSOCK—The Loyalsock Telephone Company has elected officers and directors for the ensuing year as follows: R. H. Rothfuss, president; J. C. Budd, vice-president; Dr. R. H. Milner, treasurer. County Commissioner Rothfuss, J. C. Budd, Dr. R. H. Milner, John J. Sheffer, H. G. Casner, Watson A. Wilson and F. A. Hays are directors.

JOHNSTOWN—The Johnstown Telephone Company has re-elected its officers and directors for the coming year as follows: Charles Griffith, president; P. F. McAnneny, treasurer; Edwin D. Schane, secretary and general manager; directors, Charles Griffith, P. F. McAnneny, Charles J. Mayer, H. H. Weaver, P. S. Fisher, Hon. F. J. O'Connor, Dr. W. N. Lowman, William H. Smith, James P. Thomas.

INDIANA—The Indiana Telephone Company has elected the following directors for the ensuing year: J. A. Finley, Thomas Hart, M. C. Watson, Ernest Stewart, A. W. Mabon.

PHILADELPHIA—The United Telephone and Telegraph Company has elected the following officers for the ensuing year: Richard G. Park, president; W. D. Barnard, vice-president; S. R. Caldwell, secretary and treasurer; R. G. Park, W. D. Barnard, Simon P. Light, Ward R. Bliss, C. M. Clement, Ellis L. Orris, executive committee.

MANSFIELD—The Citizens' Mutual Telephone and Telegraph Company has elected officers as follows: W. J. Squires, president; W. A. Davy, secretary; Homer J. Ripley, treasurer. Lewis H. Palmer, L. L. Reynolds, W. H. Hatfield, J. C. Rexford, directors.

WELLSBORO—The Farmers' Mutual Telephone Company has elected the following officers: Francis Kelly, president; L. F. Thompson, secretary and treasurer. Directors, E. J. Tuttle, E. C. Howell, C. H. Harkness, J. F. Haverly, T. E. Bowen, Seth Peake, W. M. Kehler, J. L. Hager, A. B. A. Briggs, A. O. Dockstader, W. W. Bastian, George F. Curtiss.

HYNDMAN—The Western Maryland and Hyndman Telephone Company has elected the following officers: Dr. Warren H. Reynolds, president; Urner G. Carl, secretary and treasurer; George W. Randall, general manager.

MORGANTOWN—The Conestoga Telephone and Telegraph Company has elected the following officers for the ensuing year: H. M. Hertzler, president; Jacob Hartz, vice-president and secretary; H. B. Best, treasurer; S. H. Mast, auditor.

HARRISBURG—The Cumberland Valley Telephone Company has elected officers as follows: Hon. B. F. Meyers, president; W. D. Barnard, vice-president; Frank F. Ziegler, secretary; S. P. Caldwell, treasurer.

SOUTH DAKOTA.

YANKTON—The Yankton Independent Telephone Company has elected the following directors for the ensuing year: C. H. Dillon, W. H. Edmunds, J. J. Wagner, E. A. Bouska, R. H. Jones, E. A. Bruce, Peter Byne.

EMERY—The Tri-County Mutual Telephone Company has elected the following officers for the coming year: H. A. Rademacher, president; H. M. Blecker, secretary; J. J. Hofer, treasurer.

KIMBALL—The Kimball Telephone Company has elected officers as follows: Dr. Willey, president; C. R. Tinan, vice-president; A. S. Stuver, secretary; H. W. Hinrichs, treasurer; A. M. Bowles, general manager.

WEST VIRGINIA.

WHEELING—The National Telephone Company has elected the following officers for the ensuing year: Henry Schmulbach, president; J. J. Walsh, vice-president; Louis J. Bayba, treasurer; W. C. Handlan, secretary and general manager.

VAN VOORHIS—The Farmers' Telephone Company has elected officers as follows: Isaac Van Voorhis, president; Asa M. Sterling, vice-president; Dr. W. A. Brown, secretary; E. F. Moore, treasurer and general manager.

PARKERSBURG—The West Virginia Telephone Company has elected the following officers for the ensuing year: J. H. Lininger, Harrisonville, president; J. E. Carle, Eatons, vice-president; R. H. Rutherford, Zanesville, secretary; John F. Dowd, Parkersburg, treasurer; A. C. Davis, Parkersburg, general superintendent and office manager.

WISCONSIN.

MILWAUKEE—The Independent Consolidated Telephone Company has elected officers as follows: A. L. Hutchinson, Weyauwega, president and general manager; Dr. G. C. Marlow, Lancaster, vice-president; N. W. Low, Weyauwega, secretary and treasurer.

GRAND RAPIDS—The Wood County Telephone Company has elected the following officers: G. W. Paulus, president; J. E. Daly, vice-president; Theo. Brazeau, secretary; G. W. Davis, treasurer; F. C. Stark, general manager.

MERRILL—The Merrill Telephone Company has elected officers as follows: H. R. Fehland, president; Geo. A. Foster, vice-president; S. Heineman, treasurer; Julius Thielman, secretary and superintendent.

STEVENS POINT—The Stevens Point Telephone Company has elected the following officers for the coming year: W. M. Copps, president; C. A. Humacker, vice-president; F. F. Groelle, secretary; F. A Krembs, treasurer.

ELK MOUND—The Elk Mound Telephone Company has elected the following officers for the ensuing year: J. O. Smith, president; F. C. Jacobs, vice-president; Dr. J. E. McCoy, secretary and treasurer.

LENA—The Lena Telephone Company has elected officers as follows: J. N. Bassett, president; Tony Kadlec, vice-president; Dr. I. C. Grant, treasurer.

WAUSAU—The Wausau Telephone Company has elected the following officers: F. P. Stone, president; W. F. La Du, vice-president; C. S. Gilbert, secretary; A. L. Kreutzer, treasurer.